NAS Data Communications Guide

Version 14.0

October 27, 2023

Change History

Version	Date	Description of Change
1.0	April 30, 2015	Initial issue of the Data Communications Implementation Team (DCIT) Tower Data Link Services (TDLS) Departure Clearance Service (DCL) Flight Deck User Guide
2.0	March 31, 2016	TDLS System update – Push DCL, cockpit flow diagram and description of logon procedure with PUSH DCL services, General document update to include Airbus aircraft pictures for integrated CPDLC interface and DCDU (requires an update from AIRBUS to reformat pictures to align with initial deployment of DCL service)
3.0	February 28, 2017	TDLS update – Flight crew awareness phrase add for loadable routes, change of revised DCL functionality, graphics update supporting TDLS 12.2 software update, general content update to support TDLS 12.2 software update, KUSA logon information fy17, 2nd qtr. name change of document to "NAS Data Communications Guide"
4.0	December 20, 2017	Reordering of the document. New Sections added for S1P2 En-Route CPDLC Initial services, added new material into the appendix sections, review and general update
5.0	November 8, 2018	Various updates throughout the document: Updated Appendix D Table 5 (ICAO FPL Field 10a and Field 18 DAT/Codes); created new section 8.3 regarding stand-alone Confirm Assigned Altitude; various updates regarding system enhancements through ERAM EAE130 release; removed Monitor TOC sections/references.
6.0	March 19, 2019	Various updates throughout the document surrounding ground system enhancements implemented through the TDLS 12.6 release. Removed Appendix A B777 CPDLC DCL Procedure Examples and Appendix B Airbus CPDLC DCL Procedure Examples.
7.0	May 15, 2019	Various updates throughout the document surrounding ground system enhancements implemented through the EAE200 release.
8.0	September 10, 2019	Various updates throughout the document surrounding ground system enhancements implemented through the EAE210 and EAE300 releases; changed "session" references to "connection".
9.0	January 23, 2020	Updated Appendix A for a ground system enhancement implemented through the EAE310 release.
10.0	February 11, 2021	Various updates throughout the document surrounding ground system enhancements implemented through the EAE410 release.
11.0	May 26, 2021	Various updates throughout the document from review by NATCA, BTS, FAA, and Pilot SMEs.

Version	Date	Description of Change
12.0	March 7, 2022	Section additions and significant updates throughout the document surrounding ground system enhancements implemented through the EAF100 release.
13.0	February 14, 2023	Added Blocked List explanation to the document.
14.0	October 27, 2023	Removed “Future Use – Currently Disabled” from UM83 text and added message examples. Updates made to ICAO FPL Field 10a and Field 18 DAT/Code table.

Executive Summary

As part of the FAA NextGen introduction of advanced communications services in the National Airspace System (NAS), Controller Pilot Data Link Communication (CPDLC) has been introduced at local Tower Data Link Service (TDLS) equipped facilities to provide the delivery of departure clearances and revised departure clearances through advanced automation. Future En Route ATC CPDLC services providing both transfer of communication, lateral and vertical navigation related ATC clearance services have begun deployment to key en route sites. The *NAS Data Communications Guide* introduces flight crews to the concept of CPDLC in the NAS and outlines the roles of the Airline Operations Center (AOC), clearance delivery and En Route controllers, and flight crews. The document describes the general procedures for logging on/off, loading the flight plan, receiving clearances, responding to CPDLC clearances, and flight crew initiated ATC requests. Examples of different types of CPDLC clearances are provided with guidance for reviewing, processing and responding to the clearances.

Purpose

The following guidance material will support operators in the FAA's CPDLC Data Communications program at participating TDLS airports and En Route Air Traffic Control Centers. Operators should extract information from the NAS Data Communications Guide and DCIT CPDLC End2End documents that will support their participation in the CPDLC Operations within the National Airspace System (NAS). Recommended CPDLC procedures or guidance is supplemental to the procedures recommended in the *Data Link Communication Advisory Circular (AC 90-117), GOLD and company approved SOP's. CPDLC service described within this document are written by phase of flight and can be implied to cover both ground and air CPDLC services.* Where appropriate, this guidance should be included in flight crew standard operational procedures.

Participation in CPDLC is at the discretion of the flight crew and/or operator. Flight Crews should use approved SOP's for ATC voice and CPDLC communication (e.g., ATC CPDLC clearance should be responded with a flight crew CPDLC response and voice ATC clearances should be responded via voice). For CPDLC DCL, if the flight crew chooses not to participate, they will contact Clearance Delivery via voice for their ATC clearance or, if TDLS CPDLC DCL is inoperative, request a PDC using Standard Operating Procedures (SOP) per the ATC flight plan filing instruction and operator's guidance concerning departure clearance retrieval. For En Route CPDLC services, flight crews' participation is at their discretion.

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Chapter 1. Introduction

Voice communication frequencies used by flight crews and air traffic control (ATC) are becoming increasingly congested and will not be able to accommodate the projected increase in air traffic demand. Use of Controller Pilot Data Link Communication (CPDLC) to supplement some routine voice communications will increase efficiency, capacity, and safety. The FAA Data Communications Program (DCP) initiatives will be incrementally implemented to provide advanced communication capabilities. This transition from analog voice to digital communications results in a viable mode of communication that may predominate clearance delivery and the En Route phase of flight. The following information provides a description of FAA CPDLC services both on the ground and future En Route with additional aircraft related descriptions. Recognizing that many type of aircraft fly within the NAS, this document only shows a representation of flight deck CPDLC messages to some aircraft designs. Operators should consult with their aircraft OEM for actual CPDLC functionality and cockpit design and display capability.

Chapter 2. CPDLC Communication on the Flight Deck

2.1 Controls and Indicators supporting CPDLC

On some Boeing implementations, the Engine Indicating and Crew Alert System (EICAS) advisory message "• **ATC**" (as shown in Figure 1) **or Airbus aircraft "ATC MSG" pushbutton on the glare shield** (as shown in Figure 3) along with an audible tone in the cockpit indicates that a message from ATC is available for viewing. To view the message, on Boeing implementations, select the Multifunction Control Display Unit (MCDU) ATC or ATC COMM Function key (as shown in Figure 2). Figure 3 and Figure 4 show Airbus implementations to view ATC messages.

Figure 1. Indication of ATC message (Boeing)

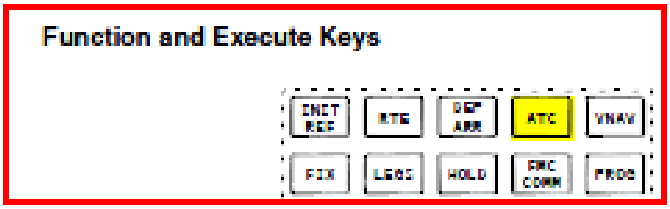


Figure 2. Function Execute Keys (Boeing)

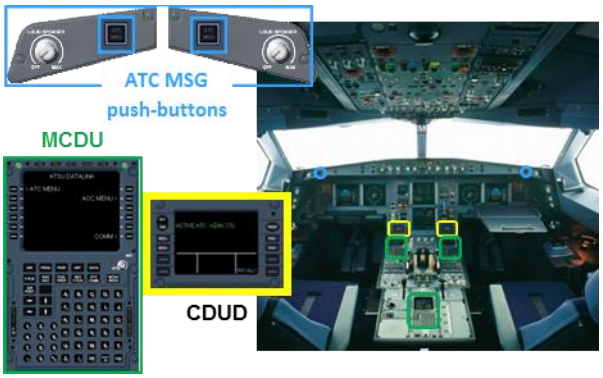


Figure 3. A320 & A330/A340 Controls and Indications for FANS (Airbus)

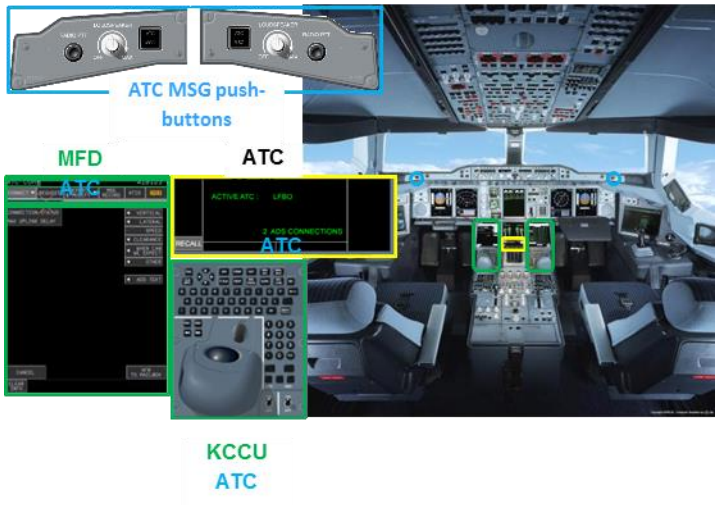


Figure 4. A380 / A350 Controls and Indications for FANS (Airbus)

Available responses to CPDLC Clearances are ACCEPT, REJECT, and STANDBY on Boeing implementations, or are WILCO, UNABLE and STANDBY on Airbus implementations (as shown in Figure 5).

Figure 5. Examples of Clearance Responses and Page Locations

2.2 The Flight Crew should ACCEPT/WILCO the CPDLC clearance when:

- After the flight crew reviews the uplinked CPDLC message per company SOP's and determines uplinked CPDLC clearance is acceptable. The flight crew should take appropriate action to comply with the CPDLC clearance; and
- If loadable route information is included with the CPDLC message, after selecting the load prompt and the FMS indicates the clearance has been successfully loaded, and the loaded route is acceptable to the flight crew per SOP's. For CPDLC DCL clearances, this may include a manual entry of the Departure Procedure (DP), transition and runway if necessary. As per SOP, flight crews must confirm no FMS discontinuities exist as they review the entire updated clearance.

Note: On Boeing aircraft the flight crew should select ACCEPT whereas on Airbus, WILCO (WILL COMPLY) is used to accept the clearance. Both of these responses are displayed as a "WILCO" response to the controller.

2.3 The Flight Crew should REJECT/UNABLE the CPDLC clearance when:

- The uplinked CPDLC clearance is not acceptable; or
- For uplinked CPDLC routes loaded into the FMS, the FMS indicates that it cannot load the clearance (e.g., the clearance was unable to be loaded or only part of the clearance loaded and the flight crew was unable to resolve the clearance); or
- For uplinked CPDLC routes loaded into the FMS and the FMS indicates inconsistencies or discontinuities with the route modification that are not addressed by AIPs or local procedures and the flight crew was unable to resolve the clearance; or
- When company policies require the flight crew to obtain a new clearance.
- The flight crew should use voice to clarify a clearance due to any confusion concerning clearance intent, loading failures, route discontinuities, inconsistencies or CPDLC system failures. If equipped, the ATC Review page (Boeing), or the FMS-ATC REJ INFO page (Airbus), or a displayed full route clearance may be used to resolve the clearance instead of voice.

  Note: On Boeing aircraft the flight crew should select REJECT whereas on Airbus, UNABLE is used; both are displayed to the controller as UNABLE.

2.4 The Flight Crew should select STANDBY when:

The Flight Crew should select STANDBY when: A timely response is not practical. For example, a STANDBY response is appropriate when company procedures require an operational assessment of the reroute by the flight crew, dispatch or the AOC. Flight crews are reminded to close out any STANDBY message response with either ACCEPT/WILCO or REJECT/UNABLE response to the original message.

2.5 Transferring Route Clearance Information to the FMS

The LOAD prompt is available (and should be used) when ATC route information is included in the CPDLC uplink. Selecting LOAD will transfer route information into the FMS Active Route (RTE) page or into the Secondary Flight Plan page allowing the flight crew to review and accept the clearance per company procedures. The FMS checks the loadable portion of the clearance to ensure it is correctly formatted and compatible with the FMS navigation database.

Note: The departure procedure and departure transition is not included in the loadable route uplink and must be manually entered by the crew into the FMS when provided in the CPDLC DCL.

2.6 CPDLC ATC Log or MSG RECORD

The “ATC LOG” or “MSG RECORD” function allows previous messages to be viewed by the flight crew when necessary.

2.7 Pilot Initiated Downlink Requests

Flight crews should not make multiple requests that are sent as a single downlink e.g., [DM10] REQUEST DESCENT TO FL310 [DM22] REQUEST DIRECT TO ROD. The FAA ground system will error back the request to the flight crew with the following response: [UM0] UNABLE [UM169] DOWNLINK MESSAGE NOT SUPPORTED. Reason - the controller may not be able to approve one of the requests when received which would result in an UNABLE to the downlinked message because the request was concatenated as a single message from the flight crew.

> *Note: All pilot requests should be in the form of a single request e.g., [DM10] REQUEST DESCENT TO FL310.*

The available pilot-initiated downlink requests are single altitude, direct to fix, and voice contact requests. Emergency downlinks are available when required.

2.8 Flight Crew/ATC Initiated CPDLC Termination

If the flight crew elects to disconnect their ATC CPDLC connection, or the CPDLC connection is terminated by the controller, all subsequent ATC clearance services will be handled via voice. Accepted CPDLC clearances will remain in effect for that flight unless amended by an ATC clearance via voice. When failure of the CPDLC connection is detected, the flight crew should terminate the connection and then initiate a new logon with KUSA when appropriate. When “connection” is used within this document, it is synonymous with “session” and should be considered equal when describing an ATC Connection.

Chapter 3. Departure Clearance Service (CPDLC DCL)

The Controller Pilot Data Link Communication-Departure Clearance (CPDLC DCL) provides automated assistance for delivering initial and revised departure clearances. CPDLC DCL provides the following: flight plan route, initial and requested altitude, beacon code assignment and departure frequency. CPDLC DCL messages are established message sets in Future Air Navigation System (FANS) equipped aircraft. The CPDLC DCL service is designed for use in surface operations and replaces the existing Pre-Departure Clearance (PDC) at Tower Data Link Services (TDLS) sites for participating aircraft. A summary of the roles of the Airlines Operations Center (AOC) or company dispatch, clearance delivery controller, and flight crew are described below:

- *AOC / System Dispatch* Just as in current operations, the aircraft operator will file an ATC flight plan with the Air Route Traffic Control Center (ARTCC) associated with the departure airport with appropriate FPL filing codes via a ground-to-ground communication system. Dispatch will receive dispatch copies of Departure Clearances sent to the aircraft.
- *Clearance Delivery Controller* ATC automation creates a proposed departure clearance and presents it to the controller for review. The controller may modify the departure clearance with local data, such as a Departure Procedure, and approves or revises the departure clearance. Upon delivery of the CPDLC DCL to the aircraft, the automation system forwards a copy of the departure clearance to the AOC (or company dispatch).
- *Flight Crew* The flight crew activates the CPDLC system during preflight by logging on to KUSA. The ATC ground system can accept valid logon data before the controller reviews the departure clearance for approval. Once the controller (ATC) reviews and approves the departure clearance, the ATC ground system correlates the logon with a filed flight plan and initiates a CPDLC connection between the aircraft and ATC. The ATC ground system transmits a controller approved CPDLC DCL to the aircraft. If the clearance needs to be amended (e.g., runway change, due to weather) the controller will send a message to the flight crew revising the CPDLC DCL.

Chapter 4. CPDLC DCL Flight Crew Procedures and Guidance

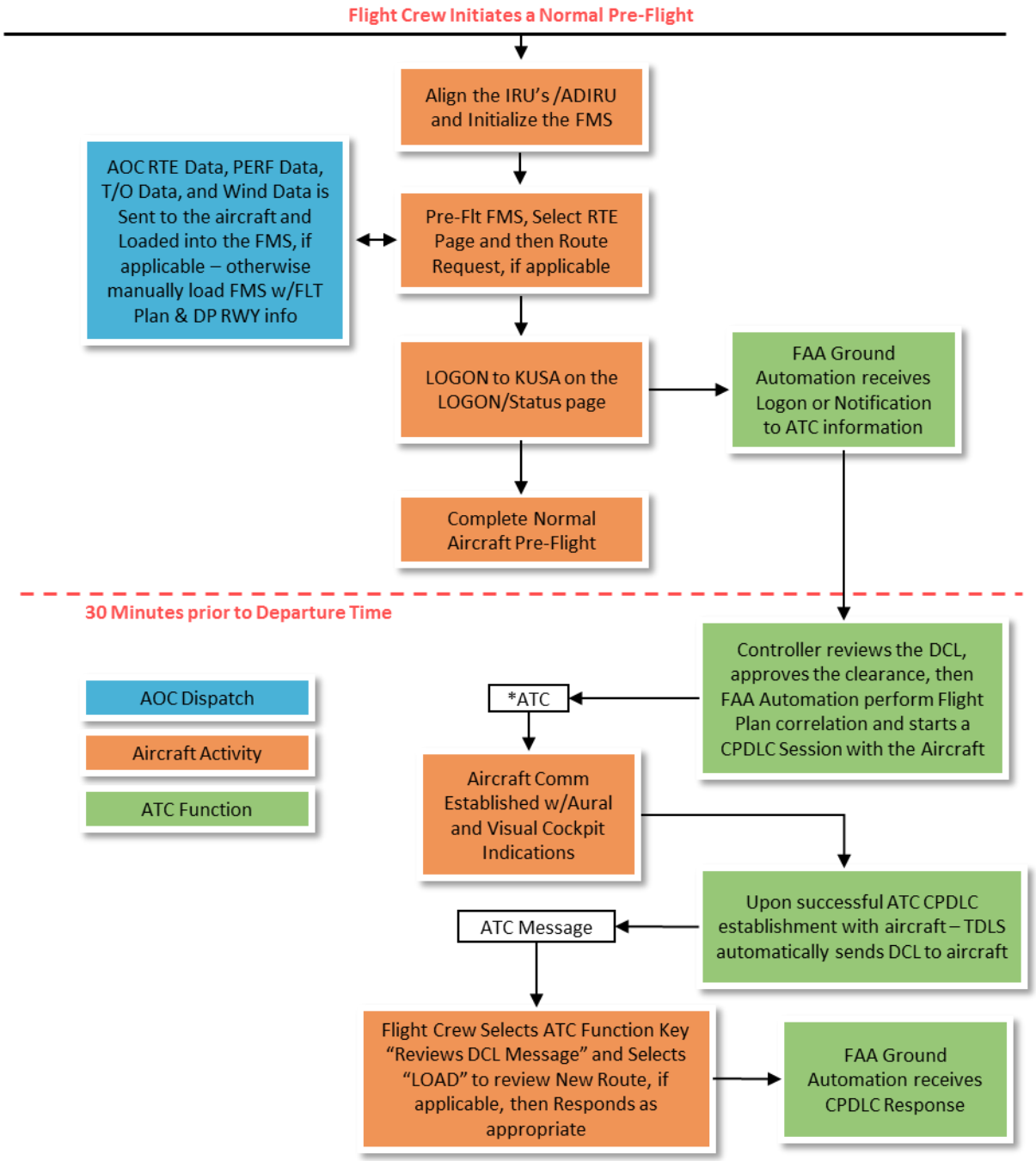


Figure 6. Overview of Flight Crew Departure Clearance (CPDLC DCL) Activities

4.1 CPDLC DCL – Loading the Original Filed Flight Plan

Flight crews will have a flight plan (paper or electronic) on board to initially load the FMS with the filed route of flight. Crews should load the flight plan that was filed with ATC into the FMS via either:

- Company FMS uplink with route, wind, performance and takeoff information, or
- Manually-entered full route, wind, performance and takeoff information from the onboard flight plan per company procedures.

4.2 CPDLC DCL – LOGON or Notification

The flight crew activates the data link system as they prepare the aircraft for the flight by logging on to KUSA. KUSA is the common National Single Data Authority (NSDA) logon address for all NAS CPDLC connections within the Continental United States.

Logon or Notification to ATC may be completed anytime during pre-flight operations. Within 30 minutes of the proposed departure time (P-30), an "ATC Connection Established" message will be received by the aircraft if the following conditions are met:

- Company dispatch has indicated to the FAA the aircraft is CPDLC DCL capable via the flight plan or subscriber data base information
- The logon information was correctly formatted
- ATC filed flight plan on file

In the event of a flight plan revision (including tail swap):

- The original flight plan must be cancelled, and a new flight plan filed, in order to preclude receiving an outdated clearance.
- If the flight crew has already logged into KUSA and subsequently changes aircraft, they should logoff before leaving the first aircraft.

If the initial attempt to logon/notification fails, flight crews should ensure that a flight plan is on file, verify the logon information is correct, then one additional logon attempt should be made. If the second logon attempt fails, the crew should revert to voice and contact clearance delivery for the departure clearance. Flight Crews should verify their current logon/notification status before attempting any additional logon/notification request. Momentary "No Comm" messages displayed in the cockpit may not indicate loss of CPDLC connection and if any questions arise concerning CPDLC connection, contact Clearance Delivery to verify connection status.

- Reverting to PDC is only available if entire CPDLC DCL service is unavailable at the TDLS parent facility e.g., KMKE is the departure airport and Chicago ARTCC is not able to support CPDLC, then if requested via the flight plan PDC would be available as the second Departure Clearance option if part of the ATC flight plan filing.

4.3 CPDLC DCL – Departure Clearance Delivery

Once a successful ATC connection has been established and your departure clearance has been approved by the controller, the CPDLC DCL will be automatically sent to the aircraft.

After the first received uplink departure clearance, if appropriate, the aircrew may request a subsequent departure clearance using the REQUEST CLEARANCE (DM25). This will result in either a CLEARED (route clearance) (UM80) or CLEARED TO (position) VIA (route clearance) (UM79) uplink message being delivered to the aircraft.

Note: When making a departure clearance request, DO NOT add any "free text" to the downlink page. If any free text information is added, the ground system will reject the message and send an auto reply message indicating: "ATSU CANNOT PROCESS DATA APPENDED TO CLEARANCE REQUEST".

Boeing Aircraft: To request the CPDLC DCL on the ATC page, select "CLEARANCE", followed by request "SEND". See Figure 7 and Figure 8 for MCDU examples.

Figure 7. Boeing ATC Index Page w/Clearance

Figure 8. Verification/Send

Airbus Aircraft: On A320/330/A340 aircraft, request the CPDLC DCL on the ATC OTHER REQ page, select "CLEARANCE". Then, select "ATC REQ DISPL" to generate the downlink on Datalink Control and Display Unit (DCDU) (as shown in Figure 9).

Figure 9. ATC OTHER REQ Page on A320/330/A340

Airbus Aircraft: On A350/380 aircraft, request the CPDLC DCL on the REQUEST page, select "GENERIC" in the "CLEARANCE" sub-menu. Then, select "XFR TO MAILBOX" to generate the downlink on Mailbox (as shown in Figure 10).

Figure 10. REQUEST Page on A350 / A380

4.4 CPDLC DCL – CONTACT ME Function

The CONTACT ME function is used by the tower controller to send a free text message to the flight crew to discuss potential route amendments. This function can be utilized prior to an initial departure clearance uplink to establish a connection in cases where the clearance cannot be generated by the ground system. In these cases, after the connection has been established, a UM169 free text message instructing the flight crew to contact ATC will be uplinked in lieu of an initial departure clearance. Alternatively this can be uplinked after an initial departure clearance has been uplinked to discuss potential amendments to the clearance. The free text will contain up to 80 characters and is adaptable per site (i.e., may not contain "CONTACT ME"). The flight crew will acknowledge the message with a ROGER downlink and contact ATC via voice, but the connection will remain in a CONTACT ME state. While a CONTACT ME free text message is open (i.e., the flight crew has not downlinked a ROGER response in return), DM25 clearance requests from the flight crew will not be displayed to the controller and will receive an automatic response by the ground system with a free text message to contact the controller by voice. The controller will have an indicator designating the connection is in the CONTACT ME state. The connection will remain in the CONTACT ME state until a departure clearance is uplinked or the flight departs.

4.5 Flight Crew Processing of uplinked CPDLC DCL

Flight crews should treat any CPDLC DCL sent to the aircraft just like they would any voice or PDC per company approved CPDLC standard operating procedures when reviewing and accepting route clearances. One additional feature of the CPDLC DCL is the ability to send revisions to a previously cleared flight plan. Revisions can be received at any time until the aircraft is ready for takeoff. Amendments can be a simple altitude change or a more complex full re-route clearance. When notified of a revised clearance, flight crews should use good judgment and follow company procedures, especially when the clearance is received just prior to takeoff.

At any time, flight crews should contact clearance delivery by voice:

- To clarify the delivered clearance
- To request an amendment
- When requested by ground control

- Anytime when confusion exists or clarification is needed
- Upon CPDLC system failures
- Whenever safety dictates

***Caution**: Flight crews should review uplink and downlink messages using approved flight deck displays. Unless otherwise authorized, the flight crew should not use printer-based information to verify CPDLC messages as printers are not usually intended for this specific purpose.*

Note: For aircraft that have CPDLC message printing capabilities, there are constraints associated with the use of the flight deck printer and crews should review their aircraft flight manual (AFM) for any limitations. Printers may not produce an exact copy of the displayed clearance with the required reliability, and should not be used as the primary display for CPDLC. However, in some cases, printed copies may assist the flight crew with clearances and other information that are displayed on more than one page, conditional clearances and crew handover briefings. As always, the flight deck display of CPDLC clearances should be used to verify the accuracy of any printed CPDLC message.

4.5.1 CPDLC DCL – At the Gate

When an initial/revised CPDLC DCL is received, flight crews should, in accordance with company policy or best operational judgment, review the initial or revised clearance and respond with ACCEPT/WILCO, REJECT/UNABLE, or STANDBY, when appropriate.

4.5.2 CPDLC DCL – Off the Gate

Flight crews should, in accordance with company policy or best operational judgment, review the revised clearance and respond with ACCEPT/WILCO, REJECT/UNABLE, or STANDBY, when appropriate .

A revised clearance may contain simple changes (e.g., a revised transponder code) or complex changes (e.g., a full re-route). Complex revisions may require substantial "heads-down" time for FMS route loading and verification. Whether or not these activities will be able to be conducted without requesting additional time from ATC will depend on a variety of factors and is at the discretion of the flight crew. In some cases, it may not be prudent to conduct these activities when the aircraft is in motion (such as approaching a runway). It is advisable to notify the appropriate ATC controller (ground or tower control) and pull out of the ground traffic flow when:

- Required by company procedures
- In areas of high traffic density or high-tempo operations
- In low-visibility or nighttime operations
- When safety dictates

4.6 CPDLC DCL – Logoff Current Data Authority (CDA) and Logon to Next Data Authority (NDA)

For aircraft participating in CPDLC DCL ground operations only, flight crews can expect an automated ATC initiated disconnect 5-10 minutes after takeoff. For aircraft participating in both DCL and En Route operations, the CPDLC connection will be retained by the ground system until a CPDLC connection is assigned to the appropriate En Route controller.

Flight crews are reminded to logoff the CDA (i.e., KUSA) and logon to other Air Traffic Service provider or oceanic remote environments as required. In the NAS, automatic handoff from the CDA to the NDA will occur with the implementation of En Route CPDLC services with bordering facilities (e.g., Toronto Center) that have CPDLC enabled for controller/flight crew use.

Flight crews should wait at least 10 minutes after landing before initiating a CPDLC DCL logon to ensure En Route Automation Modernization (ERAM) and TDLS have enough time to clear previous flight information.

Chapter 5. Types of Departure Clearances (CPDLC DCL)

5.1 CPDLC DCL "THEN AS FILED"

When no changes have been made to the filed flight plan, ATC will send a "THEN AS FILED" departure clearance that does not contain a loadable route clearance:

- Flight crews will obtain the FMS route information from the onboard flight plan or from company dispatch and manually insert the DP, transition, and runway (if applicable) obtained from the CPDLC DCL, ATIS, or other ATC source into the FMS.

5.2 CPDLC DCL "Initial Clearance" – Change from Filed Flight Plan

If ATC has modified the filed flight plan, an FMS loadable route clearance will be sent to the aircraft stating either a "CLEARED ROUTE CLEARANCE" or "CLEARED TO [position] VIA ROUTE CLEARANCE" message.

> ***Caution****: After loading the uplinked CPDLC DCL clearance, it is important to use the individual FMS pages to request AOC/company wind, performance, and/or takeoff data, or manually enter the data per company procedures. Do not use the (Boeing) AOC/Company FMS RTE page "ROUTE REQUEST" and the (Airbus) FMS INIT/CPNY F-PLN request functions for these requests.* ***Using the (Boeing) AOC/Company FMS "ROUTE REQUEST" or (Airbus) FMS INIT/CPNY F-PLN request function will delete the cleared ATC assigned route from the FMS.***
>
> *Note: On Airbus aircraft, after loading an FMS loadable route from a CPDLC clearance the flight crew should reinsert Alternate Airport/Fuel or the minimum fuel at destination as required. Also, cross checking critical flight parameters should be accomplished after all data is re-entered by the flight crew.*

5.3 Types of Revised CPDLC DCLs with Loadable Route Information

A route modification will have one of two types of FMS loadable clearances (as shown in Figure 11 and Figure 12). **Reminder: DPs, transitions, and the departure runway are always manually entered by the flight crew**.

- **Partial Reroute:** This is displayed in the DCL as a "CLEARED TO (position) VIA ROUTE CLEARANCE" and is sent when the beginning of the DCL connects downstream to the previously cleared or filed ATC route. In the example shown in Figure 11 below, the clearance from TORNN to MCB is the modified route and may be loaded into the FMS via the LOAD prompt. The DP DARTZ3.TORNN must be manually entered into the FMS along with the runway (if required).

  This type of clearance may be issued as a "revised initial clearance" as your first received CPDLC DCL or as a subsequent clearance.

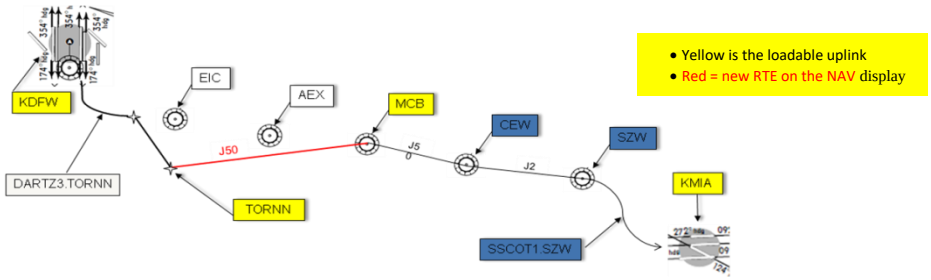


Figure 11. Depiction of a Revision to the Initial Portion of the CPDLC DCL

OR

- **Full Reroute:** This is displayed as "CLEARED ROUTE CLEARANCE" and revises the routing all the way to destination. A complete route modification that does not connect to the previously cleared flight plan (as shown in Figure 12) may be loaded into the FMS via the LOAD prompt. The DP ARDIA3.CLL must be manually entered into the FMS along with the runway (if required).

  This type of clearance may be issued as a "revised initial clearance" as your first received CPDLC DCL or as a subsequent clearance.

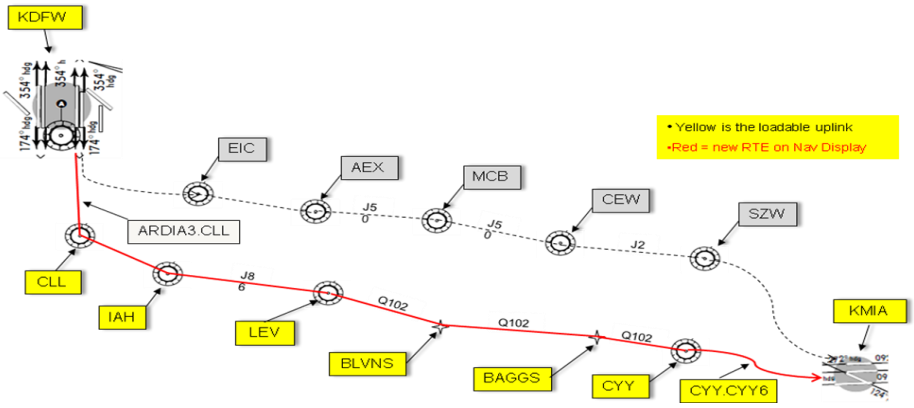


Figure 12. Depiction of a Complete Route Modification

Chapter 6. CPDLC DCL Examples

6.1 CPDLC DCL – Depiction of "THEN AS FILED"

The flight crew manually inserts the flight plan into the FMS or obtains an AOC flight plan FMS uplink prior to logging on CPDLC DCL. The Cleared as Filed (CAF) CPDLC DCL may include a DP/transition fix that will be included as free text and, if applicable, requires a manual entry into the FMS route.

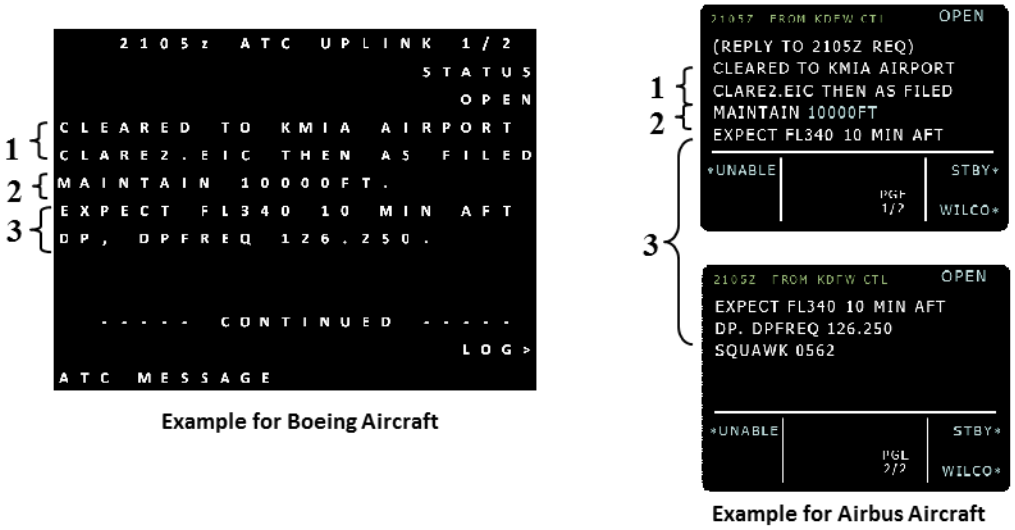


Figure 13. Depiction of CPDLC DCL Including "THEN AS FILED"

1. In the example shown in Figure 13 above, no changes have been made to the AOC Dispatch "Filed" ATC flight plan:

    a) "CLEARED TO KMIA AIRPORT" indicates the clearance to the destination airport. This is followed by;

    b) "CLARE2.EIC", DP (manually entered by the flight crew) that includes a transition fix which will connect to the ATC filed route of flight, followed by:

    c) "THEN AS FILED", will be appended after the DP/transition fix. Crew should use their flight plan to ensure the filed ATC route is inserted/loaded into the FMS and then verify the cleared route per company procedures.

2. "MAINTAIN 10000FT."

    a) This will be the "Initial" cleared altitude if included, otherwise crews can expect "CLIMB VIA SID" or "CLIMB VIA SID EXCEPT MAINT 8000 FT".

    If a "CLIMB VIA SID" is included in the clearance, then there is a vertical profile associated with the DP. Altitude and/or speed restrictions remain in force unless ATC amends the departure profile.

3. "EXPECT FL340 10 MIN AFT DP DPFREQ 126.250"

a) EXPECT altitudes are provided and should be verified against the filed flight plan. No revision notice will be provided if it is different from the filed flight plan.

i. If different from filed, use standard company procedures to determine if acceptable.

ii. EXPECT Altitudes can be provided in the following formats: minutes, miles, or free text, representing a Fix on the cleared route.

b) Departure frequency may be provided and should be verified against the departure page, if available.

6.2 CPDLC DCL – Full Route Clearance – FMS Loadable

When the filed flight plan does not exactly match the ATC provided clearance, the controller will provide the flight crew with an FMS loadable full route clearance.

Full Route Clearance is also used when a revised departure clearance is not able to join with the originally cleared route of flight. In this case, the uplinked message format in Figure 14 below, would be used for re-routes. Prior to executing the revised routing, flight crews should:

- Review the CPDLC DCL
- Load the amended clearance into the FMS
- Review the modified route with the new DP, transition, and RWY before performing an FMS execute function
- Based on company procedures, either ACCEPT/WILCO or REJECT/UNABLE the revised clearance

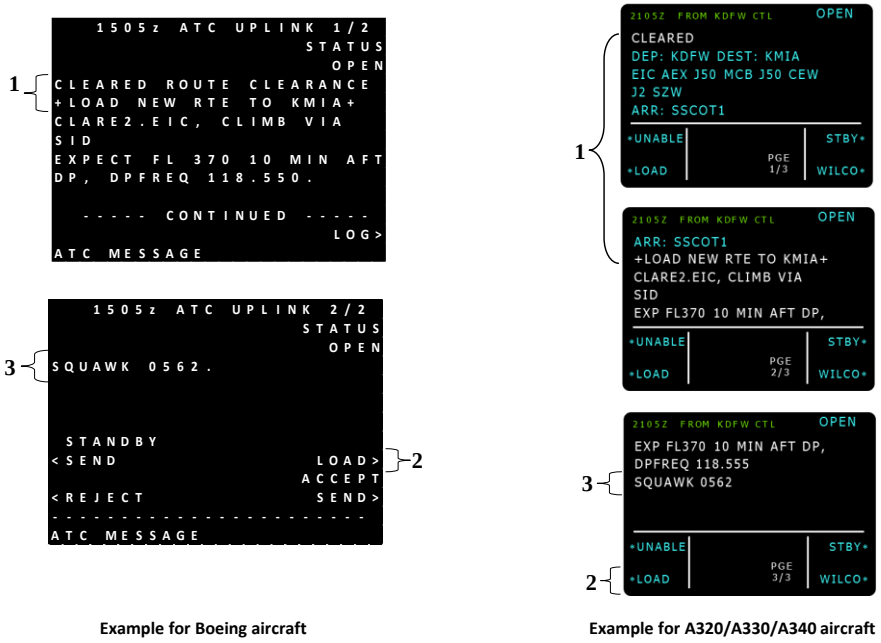


Figure 14. Depiction of CPDLC DCL Including a Full Route Clearance

1. "CLEARED ROUTE CLEARANCE" or "CLEARED", as shown in Figure 14, indicates that there has been an amendment to the filed flight plan or a "THEN AS FILED" clearance from the controller is not available and a fully loadable FMS clearance is available for review.

   Note: "+LOAD NEW RTE TO KMIA+" is a reminder to the flight crew to load the route via the load PROMPT and manually insert the DP, transition and runway if necessary before executing the amendment.

   Note: "Then As Filed" is not included in this departure clearance and the onboard flight plan does not exactly match the FMS loaded clearance. Use company procedures to verify new route when changes to the filed flight plan occur.

2. Load prompt allows the flight crew to load the ATC clearance into the FMS. Flight crews must load the ATC provided cleared route and manually insert the DP/transition into the FMS using standard operating procedures and review the clearance prior to accepting it.
3. "Squawk" should be selected in the transponder panel.

6.3 CPDLC DCL Change in Departure Procedure – Partial Reroute – Connect Downstream Clearance – FMS Loadable

A revised clearance that contains a change to only the initial portion of the flight plan and is intended to connect to a position or point on the loaded active FMS route is depicted as "CLEARED TO position VIA ROUTE CLEARANCE", with a loadable clearance, and followed by "REST OF ROUTE UNCHANGED *OR* THEN AS FILED". Prior to executing the revised routing, flight crews should:

- Review the CPDLC DCL.
- Load the amended clearance into the FMS.
- Review the modified route with the new DP, transition, and RWY before performing an FMS execute function.
- Based on company procedures, either ACCEPT/WILCO or REJECT/UNABLE the revised clearance.

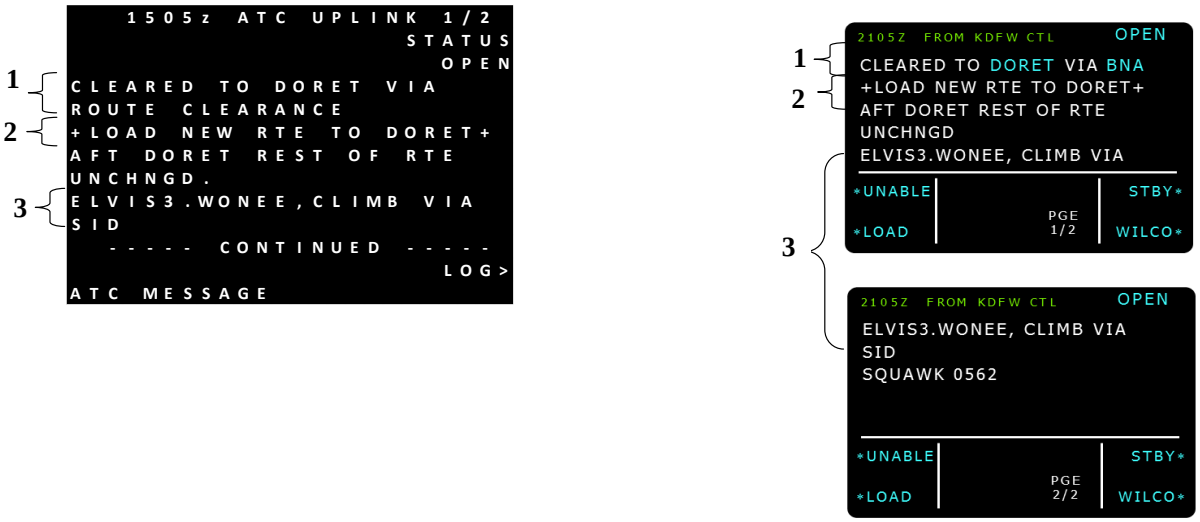


Figure 15. Depiction of Revised CPDLC DCL Including "REST OF ROUTE UNCHANGED"

- CLEARED TO DORET VIA ROUTE CLEARANCE or CLEARED TO DORET VIA BNA
    - In this example, the flight crew has received an amendment to the previously cleared ATC clearance which connects to the downstream waypoint DORET. "VIA ROUTE CLEARANCE" or VIA BNA is the loadable portion of the clearance.
- +LOAD NEW RTE TO DORET+
    - In this example, a flight crew awareness phrase is included to highlight that the uplinked CPDLC DCL contains FMS loadable information that must be inserted into the FMS via the load prompt by the flight crew. No revised header tag will be shown for uplinks that have the flight crew awareness phrase. See revised information section for information related concerning CPDLC DCL revisions.
- ELVIS3.WONEE, AFTER DORET REST OF ROUTE UNCHANGED
    - ELVIS3.WONEE is a departure procedure that must be manually inserted into the FMS.
    - AFTER DORET "REST OF ROUTE UNCHANGED" indicates to the flight crew that they are cleared via their original/previously cleared departure clearance after DORET to destination.

6.4 CPDLC DCL – Free Text Route Information for Departure Clearances with Loadable Route Information

For uplinks with FMS loadable routes, a FAA produced route string representing only the portion of the route that has been modified will be included in free text. For all UM79 and UM80 CPDLC DCLs the free text will begin at the departure airport. For UM79 clearances, a truncated route indication ("./.") between the TO point and the destination airport will be included. This supplemental information assists flight crews in route and leg verification procedures. The route string will be proceeded by 5 dashes and a single space and is limited to 256 characters.

In the event the FAA produced route string for a UM80 clearance exceeds 256 characters, then the free text route will be truncated with a "./." with the last modified route element as the last piece of information e.g., J94 FOD ./. LVZ.

In the event the FAA produced route string for a UM79 clearance exceeds 256 characters, the ground system will include the separator text, followed by the route from departure airport to the TO point (inclusive) in the free text route string so long as it does not exceed 256 characters. If the separator text and route from the departure airport to the TO point exceeds 256 characters then the following free text will be uplinked: "---- ROUTE TOO LONG TO DISPLAY IN TEXT - LOAD ROUTE TO REVIEW."

> *Note: When a DP and/or arrival transition has a period between the procedure name and the fix it is considered a named transition e.g., KSLC LEETZ2.OCS.*
>
> *Note: It is unlikely that the 256-character limit will be exceeded with most clearances.*

The following information should be considered when reviewing the free text route information:

- The loaded CPDLC DCL clearance in the FMS is your ATC clearance and the free text at the end of your CPDLC DCL is a means to cross-check the FMS loaded clearance. The Free Text route information is not loadable and may result in lengthy displayed messages (multiple pages to scroll through to reach the end of the uplink message).

- If the free text route information is different from the FMS loaded CPDLC DCL message, then the flight crew should contact ATC via voice to discuss any discrepancies.

Example of UM79 DCL Route Free Text

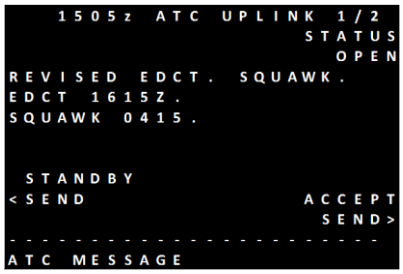
Example of UM80 DCL Route Free Text

Figure 16. Supplementary Route Information for Loadable Departure Clearances

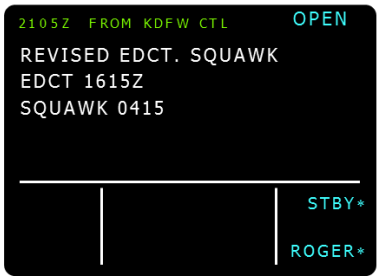
6.5 REVISED Departure Clearance – Non-Loadable Route Information

When an uplinked revised clearance is received with non-route information, it is shown to the flight crew as "Free Text". As needed by ATC, a revised header tag is populated with updated information for the flight crew. Only revised information is included in this header.

Possible revised header tags that may be attached to a revised departure clearance include: DP, ALT, EXP ALT, DEP FREQ, EDCT, or SQUAWK.



Example on Boeing aircraft



Example on A320/A330/A340

Figure 17. Depiction of a Revised Departure Clearance – Non-Loadable Route Information

Chapter 7. En Route Airspace CPDLC Communications and Connection Management

7.1 Takeoff with a CPDLC Connection Established from a TDLS Airport

After departure from an airport with CPDLC DCL services and the aircraft had a CPDLC connection while on the ground, the CPDLC connection will be maintained by the FAA ground system while climbing through TRACON airspace until the aircraft enters En Route airspace. Once airborne, the CPDLC connection will be verified by the ground system. If the ARTCC has CPDLC turned on, the ground system will assign CPDLC eligibility (assuming the flight is approved for en route CPDLC services and is properly equipped) with the appropriate controller and CPDLC services may then be used. The first indication of CPDLC services availability would be an uplinked CPDLC clearance or transfer of communication from the ATC controller.

7.2 CPDLC Connection Establishment – En Route Operations

7.2.1 Takeoff without a CPDLC Connection or Logging On to KUSA while Airborne

If a flight crew is located at a non-CPDLC equipped airport, and CPDLC network coverage is available, a log on can be performed while the aircraft is on the ground. The flight crew may also log on while airborne within U.S. domestic airspace, or prior to entering U.S. domestic airspace. Assuming the logon is accepted, the connection request will be handled and established via the triggers in the next section.

7.2.2 Automatic CPDLC Connection Initiation

In general, when departing a U.S. airport without a connection and entering En Route airspace, the earliest a CPDLC connection initiation should normally occur is when the TRACON initiates the track handoff (transfer initiate message) to En Route provided the flight crew has already logged on.

If the flight crew has not already logged on, then connection initiation would immediately follow logon acceptance/correlation, provided ERAM is the controlling facility for this aircraft or has received a transfer initiate message.

Normally the En Route automation system will automatically initiate a connection with an airborne IFR aircraft that does not already have a connection using the following triggers and conditions:

a) Triggers for automatic CPDLC connection initiation:

   i) receipt of correlated logon data e.g., Filed flight plan and CPDLC AFN information match
   ii) establishment or re-establishment of a Paired track
   iii) establishment or re-establishment of surveillance track data
   iv) change of an aircraft trajectory predicted altitude from below a locally adapted connection establishment altitude to above
   v) receipt of a transfer initiate message

b) Conditions (all of which must be met) for automatic CPDLC connection Initiation are:

   i) the aircraft has a correlated logon, and
   ii) the aircraft is paired (unless originating from an external FIR), and
   iii) the aircraft has surveillance track data (unless originating from an external FIR), and

iv) the aircraft trajectory predicted altitude is above a locally adapted connection establishment altitude, and
v) the ERAM is the controlling facility for this aircraft or has received a transfer initiate message

Note: The ground system will provide the capability to adapt altitudes below which automatic CPDLC connection initiation is prohibited for active flight plans. This addresses flight deck concerns, expressed by the flight crew community, regarding aural CPDLC alerts at "low" altitudes.

7.3 After CPDLC Connection is established

After successful initiation of a CPDLC connection by the En Route automation system, the En Route system will uplink a Current Data Authority (CDA) confirmation message to confirm that the connection is recognized by the aircraft as a CDA connection. A UM169 free text message containing adapted text (e.g., CONFIRM CPDLC CONTACT WITH KUSA. ROGER/ACCEPT THIS MESSAGE) is used for this uplink.

Example on Airbus aircraft

Example on Boeing aircraft with U13

Figure 18. Automated CPDLC Confirmation to KUSA message

The flight crew's ROGER or STANDBY downlink response will confirm that the ground system is indeed the CDA. If a downlink response is not received for the initial UM169 CDA confirmation message, the ground automation will resend the UM169 CDA confirmation message.

Note: If the pilot does not acknowledge the CDA confirmation after 3 attempts, the connection will be terminated and the pilot will have to relogon to KUSA.

If the aircraft responds with DM63 NOT CURRENT DATA AUTHORITY, the connection is designated an NDA connection. In this case the ground will retry the CDA confirmation uplink after a preset amount of time (e.g., 2 min). The process is repeated as long as the aircraft continues to respond with NOT CURRENT DATA AUTHORITY, or the connection is terminated, or the preset maximum number of retries is reached. Once the flight crew responds to the uplink with a ROGER, the ground system will designate the connection a CDA connection.

Alternatively, if there is no response received for the uplink, then the process is repeated until either a response is received or the maximum number of no responses is reached (e.g., 2 retries).

Example: After the first free text uplink is sent, if no response is received (e.g., timeout), the uplink is retried 2 more times. If a NOT CURRENT DATA AUTHORITY is received instead, the uplink is retried every 2 min for up to 20 times.

Note: CDA confirmation messages will not be uplinked to aircraft that departs with a connection from a TDLS DCL facility. For these aircraft, the ground system simply coordinates transfer of CPDLC eligibility from the TDLS facility to the ARTCC/sector with track control for that aircraft. When the CPDLC connection is established by an En Route facility, eligibility will be assigned to the sector with track control. As the aircraft moves from ARTCC to ARTCC, eligibility will be managed by the system, and typically is transferred in conjunction with a TOC associated with the transfer of track control, which is covered later in this document. The sector with eligibility will show a CPDLC eligibility symbol. All other sectors will display a CPDLC connection symbol.

Note: There will be times when no sector has CPDLC eligibility for an aircraft (e.g., during the time the aircraft is transitioning through TRACON airspace or when a facility does not have CPDLC enabled). During these times, the system will hold eligibility at the national level, it will notify the pilot that "CPDLC IS NOT IN USE UNTIL FURTHER NOTIFICATION" one minute after exiting the CPDLC enabled ARTCC into a CPDLC disabled ARTCC, and it will automatically respond to flight crew-initiated downlinks with CPDLC NOT IN USE UNTIL FURTHER NOTIFICATION.

7.4 En Route Transfer of Communications (TOC) using CPDLC

7.4.1 CONTACT vs MONITOR

The ground system will provide the capability for the receiving controller to specify the TOC Message Type (MONITOR or CONTACT) to be used by the system for uplink of TOCs from each transferring sector into that receiving controller's sector.

TOC messages into another facility (e.g., New ARTCC/TRACON) will always use the CONTACT message.

When the Initial Contact (IC) function (Confirm Assigned Altitude) is disabled for the ARTCC facility, all TOC uplinks to sectors within that facility will use the CONTACT message.

Note: The IC function is currently disabled for all facilities.

7.4.2 Nominal Case

To send any CPDLC message, including a TOC, to an aircraft, a controller must have eligibility for that aircraft, and the aircraft must be marked on-frequency at that sector. CPDLC eligibility and on-frequency information is indicated near the aircraft call sign on the controller's display.

Upon each ATC transfer of track control, a TOC will be built and available for uplink at the sector with CPDLC eligibility. When the controller is ready to uplink a TOC message, that controller will select one of the available TOCs, and may modify the frequency pre-selected for that TOC before uplink.

When the TOC is to a facility outside of KUSA airspace, the session will terminate with KUSA. If there is an NDA, the next facility should pick up the connection automatically.

7.4.3 Non-Nominal Cases

The ground system will prohibit uplink of a TOC under certain conditions (e.g., when an open controller initiated uplink exists, or emergency downlink has not yet been acknowledged by the controller). In these cases, the controller may either first resolve the condition and then proceed to uplink the TOC, or direct the frequency transfer via voice.

1. Open Downlinks Exist

    a. TOC message can be uplinked with an open flight crew-initiated downlink. The open downlink will be handled in one of two ways:

        i) The system will attempt to transfer the open downlink to the next controller.
        ii) If that downlink has not been responded to and a second TOC occurs, the system will automatically close the downlink for that aircraft by automatically uplinking an UNABLE response concatenated with UM169 Free Text message element containing explanatory text (e.g., REQUEST AGAIN WITH NEXT ATC UNIT).

2. TRACON Transfers

    a. When an ARTCC into which an aircraft is being transferred does not have CPDLC On, the CPDLC connection will be released to and held at the national level until the aircraft enters a facility with CPDLC On, or meets other conditions for terminating the connection (e.g., Flight Object deletion in the ground system).

    b. When an aircraft is handed off to a TRACON within a given ARTCC, if that TRACON is the landing TRACON or the aircraft will be passing through that TRACON into the landing TRACON in that ARTCC, and no TOC is uplinked, connection termination will occur as follows:

        i) If the aircraft is above an adapted altitude, the connection for that aircraft will be terminated when the controller releases CPDLC eligibility
        ii) If the aircraft is not above an adapted altitude (designed to avoid nuisance alerts on the flight deck during critical phases of flight), the connection will not be terminated until after ground system Flight Object removal for that flight (e.g., after landing).

    c. Within a given ARTCC, if that TRACON is not the landing TRACON but the aircraft is not re-entering that ARTCC's airspace, and a TOC is not uplinked connection termination will occur as follows:

        i) If the aircraft is above an adapted altitude, and within an adapted distance of its destination, the connection for that aircraft will be terminated when the controller releases CPDLC eligibility.
        ii) If the aircraft is either not above an adapted altitude or not close enough to its destination, the connection will not be terminated until after ground system Flight Object removal for that flight (e.g., after landing).
        iii) Lastly, if an aircraft will be re-entering the ARTCC's airspace from the TRACON to which it was handed off, and a TOC is not uplinked, the connection will remain. CPDLC eligibility will be re-assigned to an ARTCC sector upon re-entry into the ARTCC.

Operational Rationale: Scenario: If the controller hands off an aircraft but does not uplink a TOC, and transfers the aircraft on voice, this allows the controller to drop display of the data block. CPDLC eligibility would be released and the system would automatically attempt to assign eligibility to an En Route sector if one had track control. In the case of a handoff to TRACON, the national CPDLC service would hold eligibility until other system conditions trigger automatic connection termination.

7.4.4 CPDLC TOC Contact Message Flow

1. When the ATC controller sends a Transfer of Communications message via CPDLC using the contact message flight crews can expect the following message type - UM117 CONTACT [unitname] [frequency]. Example (Figure 19 below): CONTACT INDY CENTER 134.750 MHZ

Figure 19. TOC Contact Message Example

2. When the aircraft receives a CPDLC TOC Contact message, it will alert the crew via an aural and visual means to indicate the aircraft has received a CPDLC message that is to be acted upon.
3. The flight crew will select the message, review the Contact message independently, confer between them the message content, input/load the new ATC frequency into the radio tuning panel and ensure it is active, respond to the CPDLC message appropriately, and then call the receiving Controller via voice with their call sign and altitude confirmation.
4. Upon receipt of the WILCO Response to the CONTACT message, CPDLC eligibility is transferred to the receiving sector and the on-frequency indication is automatically removed from the transferring sector. When the flight crew checks in via voice, the receiving controller will confirm the assigned altitude and mark the aircraft on-frequency.

7.4.5 CPDLC TOC Monitor Message Flow (Future Use – Currently Disabled)

1. When the ATC controller sends a Transfer of Communications message via CPDLC, flight crews can expect the following message type - UM120 [unitname] [frequency], concatenated with UM135 CONFIRM ASSIGNED ALTITUDE. Example: MONITOR KANSAS CITY CENTER ON 125.350 MHZ, CONFIRM ASSIGNED ALTITUDE

Figure 20. CPDLC Monitor Message with Confirm Assigned Altitude

2. When the aircraft receives the CPDLC TOC Monitor message, it will alert the crew via an aural and visual means to indicate the aircraft has received a CPDLC message that is to be acted upon.
3. The flight crew will select the message, review the Monitor message independently, confer between them the message content, input/load the new ATC frequency into the radio tuning panel and ensure it is active, and respond to the CPDLC message appropriately, then
4. The flight crew will create a response to the Confirm Assigned Altitude (UM135) by selecting the downlink Assigned Altitude Report (DM38), ensure the Assigned Altitude is properly displayed in the altitude report, verify with the flight crew member the accuracy of the altitude in the report, and then select send.

   Note: The ground system may receive one downlink response or two separate downlink responses from the flight crew to a Monitor TOC with a Confirm Assigned Altitude (CAA) instruction. Upon receipt of the WILCO response to the Monitor message, the ground system will automatically uplink an altimeter setting message if the aircraft's assigned altitude is below FL180. CPDLC eligibility will be transferred to the receiving sector, the on-frequency indication is automatically removed from the transferring sector, and the on-frequency indication is automatically marked on at the receiving sector. Until the Assigned Altitude downlink message is received from the aircraft, the IC-in-Progress indication is displayed at the receiving sector. Upon receipt of the Assigned Altitude downlink, the ground system will compare that altitude against the ATC assigned altitude and provide an alert to the controller if a mismatch is detected.

7.5 Voice Contact Request

In the event the flight crew is unable to contact the ATC controller via voice the flight crew may select the REQUEST VOICE CONTACT (DM20) message. The controller will review the flight crew initiated downlink request and either attempt to contact the flight crew via the currently assigned ATC frequency with voice communications or respond to the downlink request with a CPDLC Contact ATC uplink message with an assigned ATC frequency. Upon receipt of the Contact ATC message the flight crew should review the uplink message, select the appropriate ATC frequency, and then respond with an ACCEPT/WILCO response to the message to close out the CPDLC message followed by a voice contact to the controller.

7.6 Next Data Authority

Within the FAA NAS there may be multiple examples of flight projections where aircraft are entering and exiting US airspace into foreign ANSPs such as NAVCANADA, Mexico, Cuba, Dominican Republic and Port Au Prince. Normally, the transfer of communications via CPDLC will be handled similar to voice communications. Aircraft may transition between facilities or may cut corners in and out of sectors in a multitude of ways due to weather, traffic or normal flows. Flight crews can expect ATC communication handoff procedures via CPDLC to remain the same.

The rules of establishing and terminating CPDLC communications data authority are well established throughout FAA documents and guidance material contained in the Global Operational Data Link (GOLD) Manual using Current Data Authority (CDA) and Next Data Authority (NDA) and is briefly described here.

An active CPDLC connection allows the ATC ground system and the aircraft to exchange CPDLC messages. Within US domestic airspace, KUSA is the active CPDLC connection and is referred to as the Current Data Authority (CDA). An inactive CPDLC connection can be established upon completion of address forwarding procedure if an active CPDLC connection exists with the aircraft. The inactive CPDLC connection is referred to as the Next Data Authority (NDA). Under normal circumstances the FAA ground system will initiate a CPDLC transfer to an adjacent CPDLC enabled external facility (e.g., CZEG - Edmonton Center, Canada) automatically and without flight crew action. The following steps listed describe a CPDLC transfer to the next enabled CPDLC facility:

1. The current ground system sends an NDA (CZEG) message to notify the aircraft of the identity of the next ATSU permitted to establish a CPDLC connection (typically sent 15-45 minutes before boundary crossing).
2. The aircraft initiates address forwarding and establishes a connection with the next facility (CZEG).
   Note: The aircraft system will only accept a CPDLC connection request from the ATSU specified in the NDA message e.g., CZEG.
3. The current facility sends a CPDLC termination request message when the aircraft is in the vicinity of the boundary with the next ATSU (or in this case CZEG) and completes a successful CPDLC transfer.

An active CPDLC connection is normally terminated when the controller initiates a Transfer of Communication to an Oceanic or Non-US facility. If the controller uses voice to accomplish the transfer, a separate manual connection termination will be uplinked. Upon termination of the active connection, a seamless CPDLC connection transfer is dependent upon the receiving CPDLC-enabled facility having previously established its NDA CPDLC connection. Provided the receiving facility's NDA connection is already established, when the Current Data Authority (CDA) connection is terminated, the NDA connection in the receiving facility becomes the CDA connection, and CPDLC messaging can be continued per SOP. The flight crew should always verify the NDA transferred to the CDA prior to or passing a FIR.

The controller may terminate the active CPDLC connection by sending one of the following:

- CONTACT [icaounitname][frequency] (UM117) message element with an END SERVICE (UM161) message element; or
- CONTACT [icaounitname][frequency] (UM117) message element with a RADAR SERVICES TERMINATED (UM154) message element and an END SERVICE (UM161) message element; or
- END SERVICE (UM161) message element.

Note: An HF (High Frequency) or a VHF (Very High Frequency) frequency may be uplinked when entering adjacent airspace. When the UM117 CONTACT message is uplinked to an aircraft entering non-radar airspace, the UM154 RADAR SERVICES TERMINATED message may be concatenated to the UM117 message element.

Figure 21. HF TOC CONTACT Message Example

If the aircraft enters adjacent non-US airspace (e.g., Mexico) where data link services are not provided, flight crews can expect a termination of CPDLC services upon handoff via voice or via a Contact CPDLC message. Any future CPDLC connection must be initiated by the flight crew if desired e.g., planned entry into Oceanic Airspace.

The flight crew can always terminate the session at any time.

7.7 Blocked List

Certain situations may arise within the CPDLC system that necessitate the need to block an aircraft from being able to establish an en route CPDLC session. The following situations will warrant the need to block a registration of a particular aircraft from utilizing CPDLC:

1. Excessive logons

   There are concerns where the CPDLC system will receive, from the aircraft in excess of fifty (50) logon attempts within fifty seconds from the same aircraft. When an aircraft excessively tries to login with CPDLC and negatively affect performance the system will block this aircraft from being able to establish a session.

2. Consecutive MAS Failures
   Aircraft experiences a certain number of consecutive message assurance failures (MAS failure) during En Route CPDLC operations. If a single flight experiences a certain number of consecutive MAS failures during En Route operations:
   a. The flight will be automatically added to the blocked list
   b. The current CPDLC session will be terminated

3. Manual Addition
   Outside of the above automated blocked list processes, circumstances may arise where an aircraft will be manually added to the blocked list if it is causing increased operational impact. There are multiple reasons that an aircraft could be manually added to the blocked list, for example alternate media use, malfunctioning avionics, damaged equipment, etc.

Once added to the blocked list, an aircraft must be manually removed from the blocked list before they are able to establish a en route CPDLC session. If a operator believes their aircraft has been blocked or has any questions regarding the blocked list, please contact dcit@l3harris.com.

Note: The blocked list only applies to establishing a session in en route CPDLC operations.

Chapter 8. Altitude Instructions (Vertical Navigation)

Vertical navigation using CPDLC message capability within the NAS consist of flight crew-initiated altitude requests and controller-initiated altitude and crossing restriction uplinks. Controllers and flight crews should use normal CPDLC responses to close uplinks/downlinks when using CPDLC.

Flight crew initiated altitude requests may be accomplished anytime when the flight crew has a CPDLC connection in En Route airspace. Flight crew altitude requests to ATC are limited to a single altitude request and if desired with preformatted "Due To Weather" and/or "Due To Performance" message information. Any added free text will result in a "MESSAGE NOT DELIVERED. FREE TEXT/DUE TO REASON NOT SUPPORTED. CONTACT ATC OR RESEND REQUEST" automatic response from the FAA ground system, concatenated to an UNABLE response.

Controllers may append any of the following to an altitude clearance or response to a flight crew request when appropriate for clearance clarity:

- UM166 DUE TO TRAFFIC
- UM167 DUE TO AIRSPACE RESTRICTION
- UM169 DUE TO WEATHER

Note: UM169 DUE TO WEATHER is only available for a controller-initiated clearance. It is not available for controller use when replying to a flight crew request.

8.1 Flight Crew Altitude Requests

The flight crew may downlink the following altitude requests in En Route CPDLC services:

- DM6 REQUEST [altitude]
- DM7 REQUEST BLOCK [altitude] TO [altitude]
- DM9 REQUEST CLIMB TO [altitude]
- DM10 REQUEST DESCENT TO [altitude]

Not all aircraft have the ability to select the "Request Climb/Descend TO" messages via the CPDLC ATC menu prompts. When applicable, flight crews should select REQUEST ALTITUDE from the CPDLC altitude request page and allow CPDLC ATC application automation to format the message per aircraft design and SOP.

Flight crews may optionally concatenate and indicate a reason code as follows:

- DM65 DUE TO WEATHER
- DM66 DUE TO AIRCRAFT PERFORMANCE

Controllers, upon receipt of the flight crew-initiated altitude request, will provide a response using normal ATC CPDLC controller processes. Controllers may respond with a STANDBY, UNABLE, or with an Altitude CPDLC message.

There are three types of altitude responses (MAINTAIN, CLIMB, OR DESCEND) that a controller may send in response to a flight crew request:

MAINTAIN messages available for uplink in response to a flight crew request:

- UM19 MAINTAIN [altitude]
- UM30 MAINTAIN BLOCK [altitude] TO [altitude]

CLIMB messages available for uplink in response to a flight crew request:

- UM20 CLIMB AND MAINTAIN [altitude]
- UM36 EXPEDITE CLIMB TO [altitude]
- UM38 IMMEDIATELY CLIMB TO [altitude]
- UM31 CLIMB TO AND MAINTAIN BLOCK [altitude] TO [altitude]

DESCEND messages available for uplink in response to a flight crew request:

- UM23 DESCEND TO AND MAINTAIN [altitude]
- UM37 EXPEDITE DESCENT TO [altitude]
- UM39 IMMEDIATELY DESCEND TO [altitude]
- UM32 DESCEND TO AND MAINTAIN BLOCK [altitude] TO [altitude]

Upon receipt of a response to the altitude request, flight crews should review the uplinked CPDLC message using normal CPDLC procedures, and either respond with a WILCO, UNABLE, or STANDBY. If STANDBY is selected, flight crews will still have to respond to the CPDLC message with either a WILCO or UNABLE, when appropriate, to complete the ATC CPDLC message process. Any ambiguities or question pertaining to the CPDLC clearance should be resolved with voice communication with the controller.

8.2 Controller Initiated Altitude Uplinks

Controller initiated altitude amendments may be sent to the aircraft when operationally required to modify the assigned altitude/level of the aircraft. Controllers also have the capability to uplink a CPDLC instruction to cross a position at an assigned altitude and if required with a speed restriction e.g., CROSS UKW AT AND MAINTAIN 11,000 FT. AT 250 KTS.

Controller initiated CPDLC ATC altitude instructions are selected from the following CPDLC messages and are available for uplink to the flight crew:

- UM19 MAINTAIN [altitude]
- UM20 CLIMB TO AND MAINTAIN [altitude]
- UM23 DESCEND TO AND MAINTAIN [altitude]
- UM30 MAINTAIN BLOCK [altitude] TO [altitude]
- UM31 CLIMB TO AND MAINTAIN BLOCK [altitude] TO [altitude]
- UM32 DESCEND TO AND MAINTAIN BLOCK [altitude] TO [altitude]
- UM36 EXPEDITE CLIMB TO [altitude]
- UM37 EXPEDITE DESCENT TO [altitude]
- UM38 IMMEDIATELY CLIMB TO [altitude]
- UM39 IMMEDIATELY DESCEND TO [altitude]

Note: UM177 AT PILOTS DISCRETION may be appended to the messages above, excluding UM36, UM37, UM38, and UM39.

Controller training emphasizes EXPEDITE (UM36, UM37) and IMMEDIATELY (UM38, UM39) should only be used when voice communications are not operationally feasible.

Upon receipt of a response of a controller initiated altitude uplink, flight crews should review the uplinked CPDLC message using normal CPDLC procedures, and either respond with a WILCO, UNABLE, or STANDBY. If STANDBY is selected, flight crews will still have to respond to the CPDLC message with either a WILCO or UNABLE, when appropriate, to complete the ATC CPDLC message process. Any ambiguities or question pertaining to the CPDLC clearance should be resolved with voice communication with the controller.

8.3 Altitude Crossing Restrictions

Controller initiated CPDLC ATC crossing restrictions may be sent to the aircraft when operationally necessary to provide separation or other control guidance as part of the normal controller workflow and processes. The following altitude crossing restrictions messages are available for uplink to the flight crew:

- UM49 CROSS [position] AT AND MAINTAIN [altitude]
- UM61 CROSS [position] AT AND MAINTAIN [altitude] AT [speed]

The controller may also append one of the following reasons for the uplink:

- UM166 DUE TO TRAFFIC
- UM167 DUE TO AIRSPACE RESTRICTION
- UM169 <freetext> DUE TO WEATHER
- UM169 <freetext> DUE TO SPACING

Upon receipt of an altitude crossing restriction, the flight crew should use normal CPDLC operational procedures to review, confirm and respond to close out any pending ATC CPDLC messages. In the event a STANDBY response is initially selected for operational reasons, flight crews are reminded to return to the original CPDLC altitude or crossing restriction message and respond with either a WILCO or UNABLE, when appropriate, to close out the ATC CPDLC clearance. Any ambiguities or question pertaining to the CPDLC clearance should be resolved by voice communication with the controller.

8.4 Confirm Assigned Altitude

When a controller requires a verification of assigned altitude, the controller may uplink up a UM135 *CONFIRM ASSIGNED ALTITUDE* message to the flight crew. The flight crew will respond with a DM38 *ASSIGNED ALTITUDE [altitude]* report indicating their assigned altitude. Upon receipt of the assigned altitude downlink, ground automation will compare that altitude against the ATC assigned altitude and provide an alert to the controller if a mismatch is detected.

> *Note: UM135 CONFIRM ASSIGNED ALTITUDE requests are prohibited when a flight is assigned a block altitude. Additionally, the ground system does not accept downlinks containing a DM77 ASSIGNED BLOCK [altitude] TO [altitude] message element from any aircraft.*

8.5 Altimeter Setting Messages

When an altimeter setting is required to be provided with an altitude clearance the FAA ground system will obtain the appropriate altimeter setting and concatenate the Altitude uplink message with a named

altimeter station and altimeter setting. If the altimeter setting is greater than one (1) hour old the following concatenation will be included with the altimeter setting message "LOCAL ALTIMETER MORE THAN ONE HOUR OLD". The En Route CPDLC provided altimeter setting is not to be used for final approach when an altimeter is available from normal sources e.g., ATIS, controllers. Use normal altimeter setting procedures when conducting approach maneuvers within TRACON or Tower airspace. In the event a Remote Altimeter Setting Source (RASS) is required for operations into a facility's airspace/approach, flight crews should use approved procedures in obtaining the appropriate RASS before commencing such operations.

Note: An aircraft may also be provided an altimeter setting as a stand-alone message when transiting airspace that requires its use, or as part of the flight crews' initial contact when a MONITOR TOC is used and an altimeter is required (MONITOR TOC Future Use – Currently Disabled).

Figure 22. Altimeter Setting Message

Chapter 9. Re-route Instructions (Lateral Navigation)

CPDLC, within the NAS, allows re-routes to be accomplished with both flight crew initiated requests and controller initiated uplinks.

CPDLC allows aircraft systems to be capable of loading route clearance information from CPDLC messages directly into the FMS. The flight crew should use this capability to minimize the potential for data entry errors when executing clearances involving loadable route information.

> *Note: If a LOAD prompt is available, it should be used. Not all aircraft have the capability to load information from CPDLC message into the FMS e.g., PROCEED DIRECT TO MEM may not be loadable on one airframe where it is loadable on others. See aircraft AFM for additional information.*

If a clearance is received that can be automatically loaded via a LOAD prompt into the FMS, the flight crew should load the clearance via the LOAD prompt into the FMS and review the clearance in the MCDU/NAV display before responding to the clearance with either a WILCO or UNABLE.

> *Note: The same recommendations apply concerning when to UNABLE/REJECT a clearance as in section 2.3 or when the flight crew selects STANDBY in section 2.4 of this document. Review this section as applicable.*

For CPDLC re-route uplinks (UM79, UM80, and UM83 only), a FAA produced route string representing only the portion of the route that was modified is added at the end of the route clearance message. This supplemental information assists flight crews in route and leg verification procedures. The route string will be preceded by 5 dashes and a single space and is limited to 256 characters. A route string will never be added to a UM74.

> *Note: If a UM83 is sent that does not contain a STAR, the ground system will convert it to a UM80 message to prevent retention of a STAR from a previous route uplink.*

Message example: UM79 CLEARED TO [position] VIA [routeclearance] + UM169 [free text] + UM169 [free text]

- CLEARED TO SAWED VIA ROUTE CLEARANCE
- +LOAD NEW RTE TO SAWED+ REST OF ROUTE UNCHANGED
- ----- VCN SBY SAWED ./. KBOS

> *Note: The "./." plus the destination will not be included in the UM169 [free text] for UM79 if the route conversion ends early (e.g., due to an unknown element, a NAT route, or it is outside CONUS) because the destination cannot be validated in ERAM.*

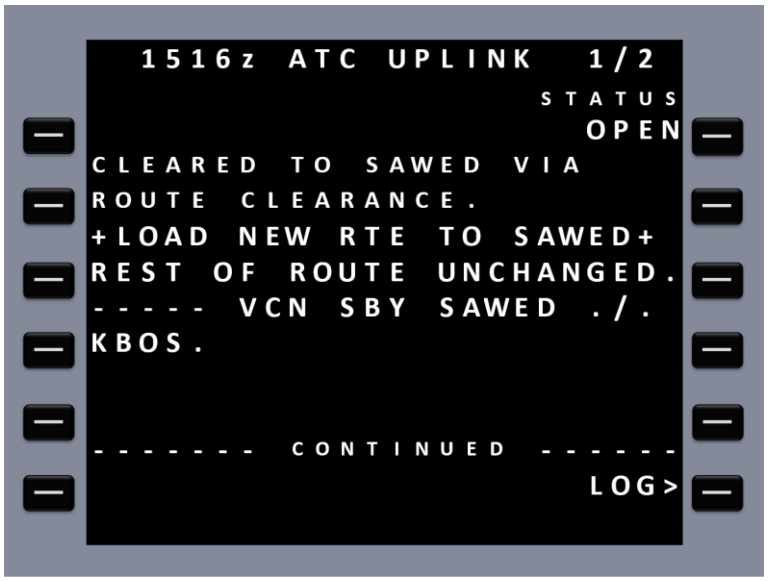


Figure 23. UM79 Route Clearance and Supplementary Route Free Text

Message example: UM80 CLEARED [route clearance] + UM169 [free text]

- CLEARED ROUTE CLEARANCE
- ----- YAZUU EMJAY J174 ORF ISO J121 CHS J79 OMN.HILEY6 KMIA

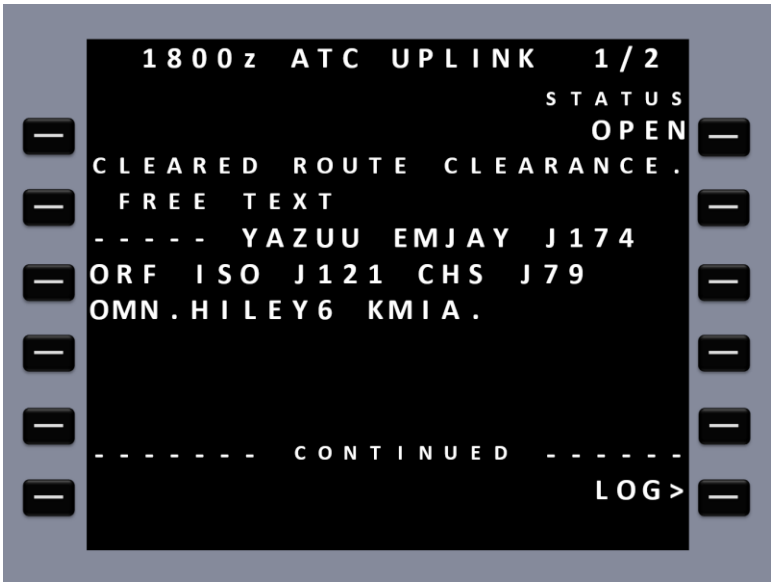


Figure 24. UM80 Full Route Clearance and Supplementary Route Free Text

Message example: UM83 AT [position] CLEARED [routeclearance] + UM169 [free text]

- AT OMN CLEARED ROUTE CLEARANCE
- ----- AT OMN CLEARED OMN MLB.BLUFI4 KMIA

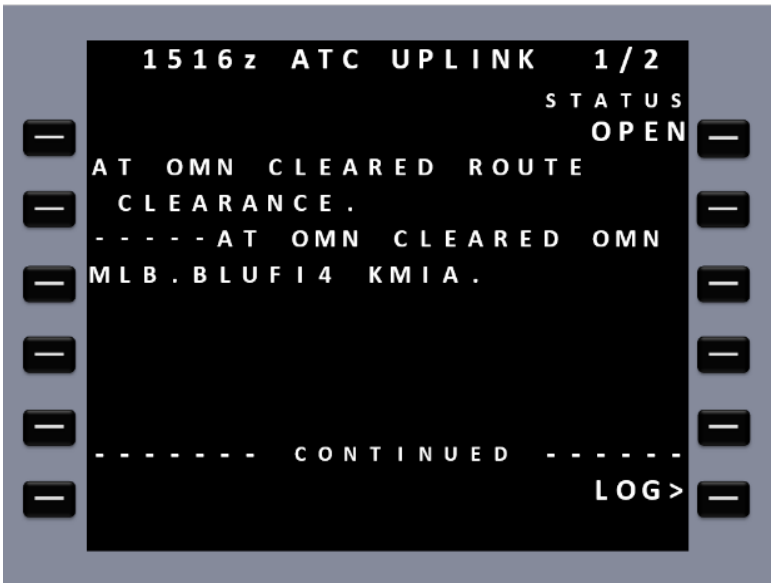


Figure 25. UM83 CPDLC Message Example: AT [position] CLEARED [routeclearance]

In the event the FAA produced route string exceeds 256 characters, then the free text route will be truncated in order to insert ./. and the destination airport. It is possible that the portion of the route which has been modified may be beyond the limit and will not be included in the truncated freetext.

The loaded route clearance in the FMS is the ATC clearance and the free text at the end of the message is a means to cross-check the FMS loaded clearance. The free text route information is not loadable and may result in lengthy displayed messages (multiple pages to scroll through to reach the end of the uplink message).

If the free text route information is different from the FMS loaded route clearance message, then the flight crew should contact ATC via voice to discuss any discrepancies.

After review of the clearance and the flight crew finds the loaded ATC clearance is acceptable, the flight crew should return to the uplinked ATC clearance and respond with a WILCO to close out the CPDLC transaction.

9.1 Flight Crew Initiated Direct-to-Fix

Flight crew initiated Direct-To-Fix requests may be accomplished anytime when the flight crew has a CPDLC connection in En Route airspace. Flight crew Direct-To-Fix requests to ATC are limited to a single fix on the active route downstream from its current aircraft position and if desired with preformatted “Due To Weather” and/or “Due To Performance” message information. Any other free text will result in a “MESSAGE NOT DELIVERED. FREE TEXT/DUE TO REASON NOT SUPPORTED. CONTACT ATC OR RESEND REQUEST” automatic response from the FAA ground system, concatenated to an UNABLE response.

The following CPDLC message is used for making this request:

- DM22 REQUEST DIRECT TO [position]

Controllers, upon receipt of the route request, will review and provide a response using normal ATC CPDLC controller processes. Controllers may respond with a STANDBY, UNABLE, or with a clearance to proceed to the requested fix CPDLC message. If a controller is unable to approve a clearance request, a "Due To" response may be appended to the clearance for flight crew awareness.

The response to a Direct-To-Fix request uses the following uplink when a controller has approved the reroute is as follows:

- UM74 PROCEED DIRECT TO [position]
- UM169 REST OF ROUTE UNCHANGED

A controller may use the Direct-To-Fix [position] uplink (UM74) if the fix position is on the currently cleared route. When the [position] is any fix other than the destination the system will automatically append UM169 REST OF ROUTE UNCHANGED.

The following example is an ATC initiated re-route - Direct-To-Fix. The aircraft is cleared direct to a fix that is located downstream in the current cleared route:

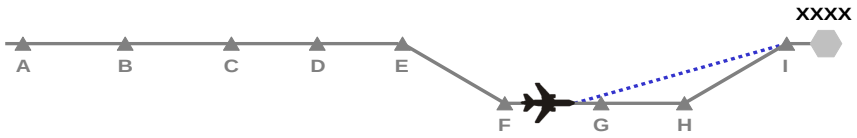


Figure 26. Direct to Fix Diagram

- ATC uplinks the clearance UM74 PROCEED DIRECT TO [position] to the aircraft.
- The flight crew responds to the clearance with WILCO, immediately loads the clearance into the FMC and proceeds direct to the cleared direct-to fix.

Once a Direct-To-Fix uplink is received, the flight crew responds to the clearance with ACCEPT/WILCO, STANDBY, or REJECT/UNABLE when appropriate. If the flight crew accepts the clearance uplink, they will immediately load it into the FMS and navigate directly to the cleared fix. If the uplink causes a discontinuity of a partial load or failed load, the flight crew should adhere to their operating procedures (which will likely lead them to REJECT/UNABLE the uplink and contact the controller by voice).

9.2 Flight Crew Initiated Procedure Requests (Future Use – Currently Disabled)

Flight crew initiated procedure requests give the pilot the capability to request a procedure. If desired, the crew may append the preformatted reason text of "Due To Weather" and/or "Due To Performance" message information. Any other free text will result in a "MESSAGE NOT DELIVERED. FREE TEXT/DUE TO REASON NOT SUPPORTED. CONTACT ATC OR RESEND REQUEST" automatic response from the FAA ground system, concatenated to an UNABLE response

The following CPDLC message is used for making this request:

- DM23 REQUEST [procedurename]

Controllers will review the request and provide a response using normal ATC CPDLC controller processes. Controllers have the option to respond with a STANDBY, UNABLE, or UM169 ATC HAS YOUR REQUEST. Responding with UM169 ATC HAS YOUR REQUEST closes the procedure request, but retains the information for later use by the controller. The flight crew must still ROGER the freetext uplink. The controller may use the retained information to compose a new route clearance uplink message containing the requested procedure.

9.3 Flight Crew Initiated Route Request (Future Use − Currently Disabled)

Flight crew initiated route requests give the pilot the capability to request a different routing. The requested route could contain any number of changes to the currently filed route. The downlink will always contain an entire route to destination, even if the request is to modify only a portion of the current route.

The following CPDLC message is used for making this request:

- DM24 REQUEST [routeclearance]

The flight crew may not downlink a DM24 containing a shortcut into a STAR. If the crew downlinks a request of this type, it will be automatically rejected by the ground system due to avionics issues loading such a clearance.

A DM24 may contain a procedure without including a transition if the arrival common point is the last position in the [routeinformation]. Otherwise, if the arrival contained in the DM24 has at least one published transition, a transition fix must be the last position in the [routeinformation], and that same transition must be specified as the [proceduretransition] in the [procedurename] variable.

When the controller opens a route request downlink for review, the ground system removes positions that the aircraft has already passed and tailors the route to begin at the first fix downroute of the current position of the aircraft.

Controllers will review the request and provide a response using normal ATC CPDLC controller processes. Controllers have the option to respond with a route uplink, STANDBY, UNABLE, or UM169 ATC HAS YOUR REQUEST.

If the controller sends a route uplink, the flight crew responds with ACCEPT/WILCO, STANDBY, or REJECT/UNABLE when appropriate. If the uplink causes a discontinuity of a partial load or failed load, the flight crew should adhere to their operating procedures (which will likely lead them to reject/UNABLE the uplink and contact the controller by voice).

If the controller sends a UM169 ATC HAS YOUR REQUEST freetext uplink, it closes the route request but retains the information for later use by the controller. The flight crew must still ROGER the freetext uplink. The controller may use the retained information to compose a new route clearance uplink message containing the requested route.

9.4 Flight Crew Initiated Weather Deviation (Future Use – Currently Disabled)

Flight crew initiated weather deviations give the pilot the capability to request a weather deviation. Controller initiated (not in response to a pilot downlink request) weather deviation clearances will be issued on voice.

The following CPDLC message is used for making this request:

- DM27 REQUEST WEATHER DEVIATION UP TO [distanceoffset] [direction] OF ROUTE

Controllers, upon receipt of the route request, will review and provide a response using normal ATC CPDLC controller processes. The controller may respond with STANDBY, UNABLE, or uplink a weather deviation clearance.

The following CPDLC messages are used for uplinking a clearance to deviate for weather:

- UM82 CLEARED TO DEVIATE UP TO [distanceoffset] [direction] OF ROUTE
- UM75 WHEN ABLE PROCEED DIRECT [position]
- UM169 REST OF ROUTE UNCHANGED (if applicable) and
- UM127 REPORT BACK ON ROUTE

  Note: UM127 REPORT BACK ON ROUTE is automatically appended to the clearance, but is an informational uplink. At the appropriate time, the crew should report when they are back on route using a DM41.

If the controller sends the weather deviation clearance in response to the crew request, the flight crew will be able to ACCEPT/WILCO, STANDBY, or REJECT/UNABLE the clearance.

9.5 Controller Initiated Route Clearance

Controller initiated route clearances may be initiated anytime the need arises to change the trajectory of the aircraft. This includes a pending Airborne Re-Route (ABRR) modification from the ARTCC Traffic Management Unit (TMU) that is passed to the controller from the FAA Command Center for route modification and the controller has approved the route amendment.

The controller with track control and CPDLC connection may uplink the following controller initiated route messages to the aircraft:

- UM74 PROCEED DIRECT TO [position]
- UM77 AT [position] PROCEED DIRECT TO [position] *(Future Use – Currently Disabled)*
- UM78 AT [altitude] PROCEED DIRECT TO [position] *(Future Use – Currently Disabled)*
- UM79 CLEARED TO [position] VIA [routeclearance]
- UM80 CLEARED [routeclearance]
- UM83 AT [position] CLEARED [routeclearance]

The controller may append to the uplinked route clearance (with an exception to an ABRR route clearance) any of the following free text messages to controller initiated route clearance:

- UM166 DUE TO TRAFFIC
- UM167 DUE TO AIRSPACE RESTRICTION

- UM169 [freetext] DUE TO WEATHER

The ground system will automatically append a UM169 [freetext] REST OF ROUTE UNCHANGED to any route clearance that does not include the destination airport.

In addition to the route free text concatenations described above, a UM169 [freetext] TRAFFIC MANAGEMENT REROUTE message may be prepended to uplinked route clearances that have been passed to the controller from the ARTCC Traffic Management Unit (TMU).

9.6 Complex Route Clearances

For more complex route amendments, the controller may uplink to the aircraft a CPDLC ATC Clearance message with FMS loadable and free text route information. To view this route modification the flight crew will be required to insert into the FMS the modified route from the CPDLC message using the FMS Load prompt or in some cases by using a two-step process using the load prompt and manually entering free text arrival information. Flight crews should use procedures described in Section 2 of this document to view, review and WILCO/UNABLE/STANDBY the uplink using Standard Operating Procedures.

> *Note: As previously discussed in the document when entering new route information into the FMS (via the load prompt or manually) flight crews should crosscheck/reenter FMS data. This may include wind information, performance, airport/alternate information, and predicted fuel parameters depending on aircraft type. Flight crews should use their company approved Standard Operating Procedures to reenter FMS required data, when appropriate.*

The re-route examples below are scenarios from GOLD First Edition, 2017 document and cover ATC re-routes with amendments on the current route and off route modifications.

9.6.1 First Waypoint in New Route is on Current Route

The following diagram with associated steps represents a combination of possible ATC initiated re-routes where the first waypoint in the new route is on the current route and there is no route discontinuity.

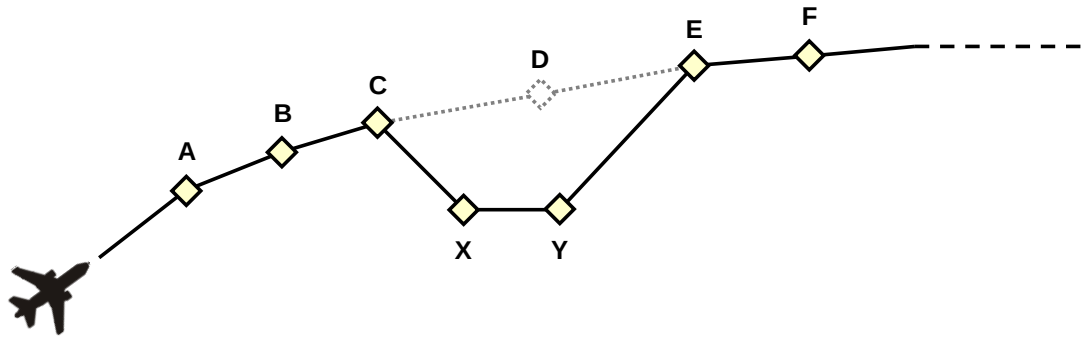


Figure 27. Complex Clearance Diagram

- ATC uplinks the clearance CLEARED TO [E] VIA [A B C X Y] to the aircraft using UM79 CLEARED TO [position] VIA [route clearance]. There is no discontinuity because the uplink fix (E) is in the existing cleared flight plan; or

Note: Forecast weather data may be lost for some waypoints when a route clearance is loaded.

- ATC uplinks the clearance CLEARED [A B C X Y E F …Dest] to the aircraft using UM80 CLEARED [route clearance]. There is no discontinuity because the entire route has been replaced. The route must be specified to destination; or

  Notes for UM80 Route Clearances:

  - For En Route CPDLC, an option is made available for operators whose aircraft have known issues loading a route clearance with a STAR Arrival and Transition. To support these aircraft an additional DAT filing code has been created (1FANSER2PDC or FANSER) that places the Arrival/Transition in an appended free text message enabling those impacted aircraft to receive a CPDLC route clearance. Flight crew will have a two-step process to select the load prompt to load ATC clearance information into the FMS and then manually insert the Arrival and Transition which will be in free text in the uplinked ATC clearance.
  - Aircraft ***without*** route loading issues will receive a full UM80 loadable route when applicable. To support these aircraft an operator must file a DAT code (1FANSE2PDC or FANSE) to support fully loadable route clearances.
  - Forecast weather data in the FMS may be lost for the whole route.

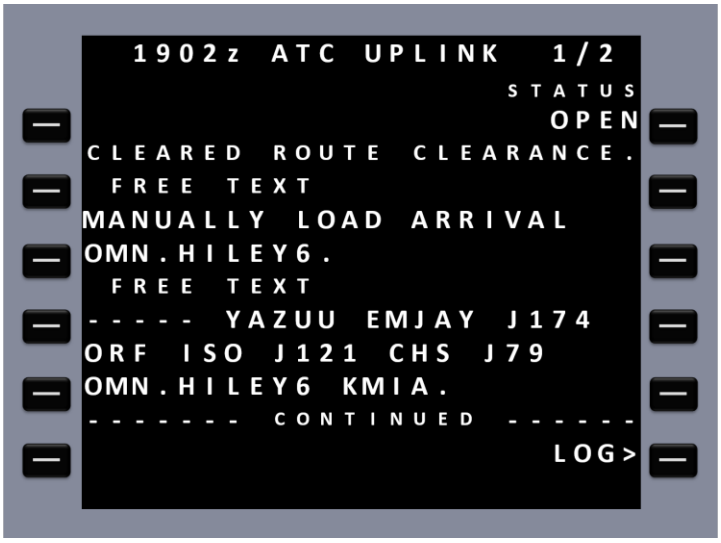


Figure 28. UM80 Clearance Uplink with Free Text Arrival – DAT Code 1FANSER2PDC or FANSER Example

- ATC uplinks the clearance AT [C] CLEARED [X Y E F …Dest] to the aircraft using UM83 AT [position] CLEARED [route clearance]. There is no discontinuity because the entire route after C was specified. The route must be specified to destination.

  Note: Forecast weather data in the FMS is lost for all waypoints after C.

- The flight crew responds to the clearance with WILCO or UNABLE, when appropriate, using approved Standard Operating Procedures

9.6.2 First Waypoint in New Route is Not on Current Route

The following diagram with associated steps represents an ATC initiated re-route where the first waypoint in the new route is not on the current route and there is no route discontinuity.

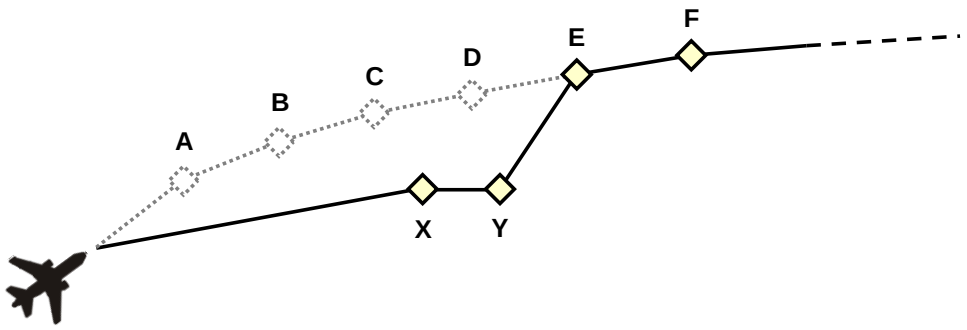


Figure 29. Complex Clearance Where First Fix is Not on Existing Route

- ATC uplinks the clearance CLEARED TO [E] VIA [X Y] to the aircraft using UM79 CLEARED TO [position] VIA [route clearance]. There is no discontinuity at E because the uplink fix (E) is in the existing cleared flight plan; or

  Note: Forecast weather data may be lost for some waypoints when a route clearance is loaded.

- ATC uplinks the clearance CLEARED [X, Y, E, F …Dest] to the aircraft using UM80 CLEARED [route clearance]. The entire route is replaced, and the route must be specified to destination.

  Notes for UM80 Cleared Route Clearance:

  - For En Route CPDLC, an option is made available for operators whose aircraft have known issues loading a route clearance with a STAR Arrival and Transition. To support these aircraft an additional DAT filing code has been created (1FANSER2PDC or FANSER) that places the Arrival/Transition in an appended free text message enabling those impacted aircraft to receive a CPDLC route clearance. Flight crew will have a two-step process to select the load prompt to load ATC clearance information into the FMS and then manually insert the Arrival and Transition which will be in free text in the DCL.
  - Aircraft without route loading issues will receive a full UM80 loadable route when applicable. To support these aircraft an operator must file a DAT code (1FANSE2PDC or FANSE) to support fully loadable route clearances.
  - Forecast weather data in the FMS is lost for the whole route.

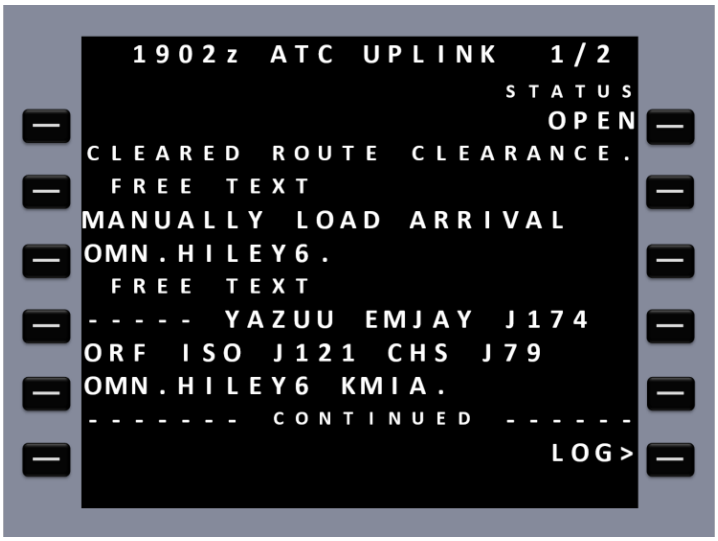


Figure 30. UM80 Clearance Uplink with Free Text Arrival – DAT Code 1FANSER2PDC or FANSER Example

- The clearance above takes immediate effect and, since the first fix specified (X) is not on the existing route of flight, the new route effectively starts with "present position direct X," although this is not explicitly stated in the uplink message.
- The flight crew responds to the clearance with WILCO or UNABLE, as appropriate using approved Standard Operating Procedures.

9.7 Confirm Assigned Route (Future Use – Currently Disabled)

When a controller requires verification of an aircraft's assigned route, they may uplink a UM137 CONFIRM ASSIGNED ROUTE message to the flight crew. The flight crew will respond with a DM40 ASSIGNED ROUTE [routeclearance] report containing their assigned route. Prior to displaying the downlinked route to the controller, the ground system removes (tailors) positions that the aircraft has already passed. The controller will then manually compare the downlinked route against the ATC assigned route.

Chapter 10. Speed and Time Instructions

10.1 Speed Clearance

Controllers may uplink a speed clearance to one or multiple aircraft at a time. The controller can either manually select a speed or use the GIM-S (Ground-Based Interval Management - Spacing) recommended speed. Uplinks containing True airspeed are not supported, and speed uplinks containing more than one speed value are prohibited.

The speed value must be uplinked in either Mach Speed between .61 and .99 in increments of .01, or Indicated Airspeed between 70 and 380 knots in increments of 10 knots. Alternatively, the controller can instruct the flight crew to resume normal speed.

Speed clearance messages available to be uplinked include:

- UM106 MAINTAIN [speed]
- UM108 MAINTAIN [speed] OR GREATER
- UM109 MAINTAIN [speed] OR LESS
- UM116 RESUME NORMAL SPEED

The controller may also append one of the following reasons for the uplink:

- UM166 DUE TO TRAFFIC,
- UM167 DUE TO AIRSPACE RESTRICTION,
- UM169 <freetext> DUE TO WEATHER, or
- UM169 <freetext> DUE TO SPACING

Once a speed clearance uplink is received, the flight crew responds to the clearance with ACCEPT/WILCO, STANDBY, or REJECT/UNABLE when appropriate. If the clearance is accepted, the crew will adjust their speed according to the clearance instructions.

10.2 Confirm Speed

When a controller requires verification of an aircraft's speed, they may uplink a UM134 CONFIRM SPEED message to the flight crew. The flight crew responds with a DM34 PRESENT SPEED [speed] report indicating their current speed in either Mach (rounded to an increment of .01) or Indicated airspeed (rounded to an increment of 10 knots). Upon receipt of the present speed downlink, the controller will review the downlinked speed.

> *Note: If a pilot downlinks a DM34 with a freetext element included, the speed report will still be processed and displayed to the controller, but the freetext will be discarded by the ground system. The crew will be notified the speed report downlink was received, but the freetext was not shown to ATC. The crew can then decide if a voice call to ATC is warranted.*

10.3 Speed Crossing Restrictions

The following speed crossing restrictions that specify a speed value may be uplinked by a controller:

- UM55 CROSS [position] AT [speed]
- UM56 CROSS [position] AT OR LESS THAN [speed]
- UM57 CROSS [position] AT OR GREATER THAN [speed]
- UM61 CROSS [position] AT AND MAINTAIN [altitude] AT [speed]

The controller will select the crossing speed in either Mach (between .61 and .99, increments of .01) or Indicated Airspeed (between 70 and 380 knots, increments of 10 knots).

The controller may also append one of the following reasons for the uplink:

- UM166 DUE TO TRAFFIC
- UM167 DUE TO AIRSPACE RESTRICTION
- UM169 <freetext> DUE TO WEATHER
- UM169 <freetext> DUE TO SPACING

Once a speed crossing restriction uplink is received, the flight crew responds to the clearance with ACCEPT/WILCO, STANDBY, or REJECT/UNABLE when appropriate. If the clearance is accepted, the crew will adjust speed as appropriate to meet the speed constraint.

10.4 Time Crossing Restrictions (Future Use – Currently Disabled)

The following crossing time instructions that specify required time of arrival (RTA) at a position may be uplinked by a controller:

- UM51 CROSS [position] AT [time]
- UM52 CROSS [position] AT OR BEFORE [time]
- UM53 CROSS [position] AT OR AFTER [time]

The controller may also append one of the following reasons for the uplink:

- UM166 DUE TO TRAFFIC
- UM167 DUE TO AIRSPACE RESTRICTION
- UM169 <freetext> DUE TO WEATHER
- UM169 <freetext> DUE TO SPACING

Once a time crossing restriction uplink is received, the flight crew responds to the clearance with ACCEPT/WILCO, STANDBY, or REJECT/UNABLE when appropriate. If the clearance is accepted, the crew will adjust speed as appropriate to meet the time constraint.

Chapter 11. Holding Instructions (Future Use – Currently Disabled)

Controllers may issue a holding clearance via a UM91 HOLD AT [position] MAINTAIN [altitude] INBOUND TRACK [degrees] [direction] TURNS [leg type] uplink.

Holding instructions include:

- The [position] will be a future fix on the currently cleared route
- The [degrees] will be a three digit value from 001 to 360
- The [direction] will be Left or Right
- The [leg type] will be either Legdistance (values in whole units from 1 to 99 NM) or Legtime (values in whole units from 1 to 9 min).

The currently cleared altitude is automatically used for the [altitude] variable. The ground system will only allow the hold uplink if the currently cleared altitude is in single altitude format. If the currently cleared altitude is below FL180, the ground system will not concatenate the altimeter associated with the holding fix area to the holding clearance.

The uplinked holding clearance will always include the following elements:

- UM91 HOLD AT [position] MAINTAIN [altitude] INBOUND TRACK [degrees] [direction] TURNS [leg type]
- UM93 EXPECT FURTHER CLEARANCE AT [time]

A UM93 EXPECT FUTHER CLEARANCE AT [TIME] can also be uplinked by itself. The [TIME] will be in the hhmm format and in UTC. The default Expect Further Clearance (EFC) [TIME] is 30 minutes past the estimated time of arrival at the holding [position], however, the controller can specify a different EFC time while generating the hold uplink.

When the flight crew views a holding clearance message, they may select STANDBY (DM1), review the new instructions, enter the appropriate information into the avionics, and execute the hold. The flight crew must also press ACCEPT/WILCO which will downlink the WILCO (DM0) response to the ground system.

After the initial UM91 + UM93 has been uplinked and accepted by the flight crew, the controller may edit the EFC time and uplink a standalone UM93. Additionally, the controller may uplink an altitude clearance after the holding clearance has been accepted.

Chapter 12. Informational CPDLC Messages (Future Use – Currently Disabled)

Informational uplink messages can be manually uplinked by the controller, automatically uplinked by the system, and concatenated with other uplinks. Informational uplinks will be open on the flight deck until the crew responds to the uplink. Multiple informational uplinks can exist at a time. When appropriate, flight crews ACCEPT/ROGER the uplinks to acknowledge and close them, unless they are concatenated with a clearance, in which case they will be closed when the clearance is closed with ACCEPT/WILCO or REJECT/UNABLE. Pilot downlink reports are expected for UM127 and UM137.

Informational uplink messages include:

- UM127 REPORT BACK ON ROUTE
- UM137 CONFIRM ASSINGED ROUTE
- UM153 ALTIMETER [altimeter]
- UM169 ATC ADVISORY uplink
- UM169 Freehand Freetext uplink
- UM169 ATC HAS YOUR REQUEST

Note: UM153 ALTIMETER is introduced in S1P2 Initial Services.

Chapter 13. ATC Advisories and Freehand Freetext Messages (Future Use – Currently Disabled)

Controllers may uplink an ATC Advisory or Freehand Freetext to provide the flight crew with operationally relevant information or guidance. Advisories and Freehand Freetext are informational uplinks consisting of UM169 freetext message elements. When an ATC Advisory is uplinked, it will be automatically given the prefix “ATC ADVISORY --” for display to the crew. This prefix is not appended to Freehand Freetext uplinks. Freehand Freetext may be used by controllers to communicate to the flight crew in the event of an emergency if voice communications are not feasible. Upon receipt of an ATC Advisory or Freehand Free text message, the flight crew should use normal CPDLC operational procedures to review, confirm, and respond with an ACCEPT/ROGER. Any ambiguities or questions pertaining to the message should be resolved by voice communication with the controller.

Chapter 14. Emergency CPDLC Messages

When a flight crew initiated emergency downlink is received by ground automation the En Route controller that has track control and CPDLC eligibility will have the ability to display and review the emergency message, but will not have the ability to acknowledge the emergency downlink via CPDLC. The only emergency downlink message that is not closed upon sending is the DM68 [free text]. The DM68 message technically requires a ROGER response from the ground, however the ground system/controller will not uplink a ROGER. Flight crews can expect voice contact from the controller, and both parties should use standard operating procedures to resolve the emergency condition that prompted the CPDLC emergency downlink.

If an aircraft is transiting airspace where CPDLC connection is not at an active controller workstation, then the emergency message will be made available to a supervisor workstation at the ATC En Route facility and at the National CPDLC site where an alert will be given to the facility to notify them that an Emergency downlink has been received.

The following emergency flight crew initiated downlink CPDLC messages are supported:

- DM55 PAN PAN PAN
- DM56 MAYDAY MAYDAY MAYDAY
- DM57 [remainingfuel] OF FUEL REMAINING AND [remainingsouls] SOULS ON BOARD
- DM58 CANCEL EMERGENCY
- DM59 DIVERTING TO [position] VIA [routeclearance]
- DM60 OFFSETTING [distanceoffset] [direction] OF ROUTE
- DM61 DESCENDING TO [altitude]
- DM68 [freetext]
- DM80 DEVIATING [distanceoffset] [direction] OF ROUTE

Flight crews and controllers should use standard emergency procedures to take care of the emergency condition and reestablish voice communications as applicable.

Chapter 15. Tie-Off Functionality

When significant new functions are implemented, tie-offs are usually implemented in the ground system to allow all or a portion of these new functions to be disabled. The presence of tie-offs allows a new release to continue to operate if functional or procedural deficiencies are discovered.

15.1 Tie-Off Availability

The ground system provides each facility with the ability to disable different CPDLC services. While a service is disabled, controllers will be unable to uplink any messages of the service type. Any new downlinked flight crew requests or reports of the service type will be rejected as well, resulting in an UNABLE concatenated with a free text reject message. The table below outlines the available tie-offs and their effect on the system.

> *Note: If a service is disabled after being turned on and an open message of that service type exists, the ground system will still accept standard response options from the crew (i.e., WILCO, ROGER, or UNABLE) to close the uplink normally. If an open flight crew request exists associated with the disabled service type, controllers will only have the ability to respond with UNABLE.*

Table 1. Available Tie-Offs

Tie-Off	Effect	Service Type Affected
CPDLC	Disables all CPDLC messages. Voice communication must be used for all services.	Initial/Full
IC	Disables the Initial Contact (IC) function (MONITOR TOCs). Only CONTACT is available for TOCs.	Initial
ROUTES	Disables all route clearances and flight crew route requests.	Initial/Full
ALTITUDES	Disables all altitude-related uplinks (including Hold service) and flight crew altitude requests.	Initial/Full
ALLFULL	Disables all functionality added with Full Services, including Full Route Services, Block Altitudes, ATC Advisory/Freetext	Full

Tie-Off	Effect	Service Type Affected
	Messages, Hold service, and certain DUE TO additions to the UM49 and UM61.	
FULLRTE	Disables the capability to uplink UM77, UM78, UM137, and the processing of DM23, DM24, DM27, DM41 messages. Disabling the Full Route Service also disables the Hold Service.	Full
ALTFIX	Disables the capability to uplink UM78 messages.	Full
UM83	Disables the capability to uplink UM83 messages.	Initial
HOLD	Disables the holding clearance and EFC uplink messages.	Full
CAR	Disables the capability to uplink UM137 messages.	Full
ADVISORIES/ FREE TEXT	Disables the capability to create, uplink, and save ATC Advisories and to create and uplink Freehand Freetext messages.	Full
SPEEDS	Disables all speed messages, including speed clearances, speed crossing restrictions, time crossing restrictions, and confirm speed services.	Full
XTIME	Disables time crossing restriction messages.	Full

15.2 Tie-Off Hierarchy

Many tie-offs are inter-related. Disabling a higher-level service will automatically disable lower-level services. However, when the higher-level service is re-enabled, the lower-level services remain disabled and must be manually re-enabled. Tie-off hierarchy is shown in Figure 31.

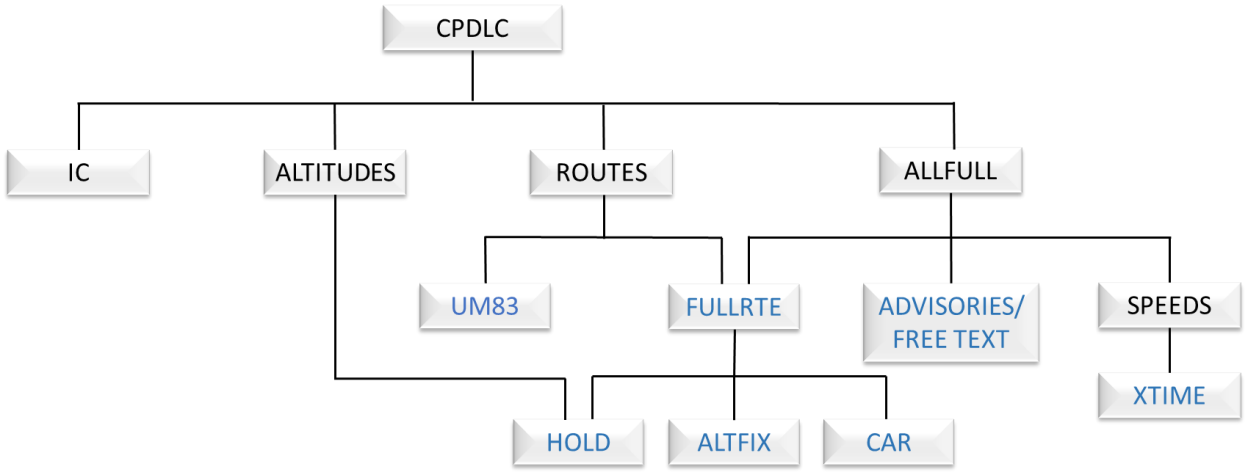


Figure 31. Tie-Off Hierarchy

The tie-off switches are dynamic and locally adaptable (i.e., can be controlled by each facility independently). The default state for each switch is disabled (OFF) and can be explicitly enabled after CPDLC is enabled at the facility.

When the CPDLC service is switched to OFF, the Initial Services are switched to OFF (including IC, ROUTES, ALTITUDES, UM83), as well as any Full Services (including FULLRTE, HOLD, ALTFIX, CAR, ADVISORIES/FREE TEXT, SPEEDS, XTIME).

The ALLFULL function, when disabled, will disable all uplink/downlink functions that are supported by Full Services. The ALLFULL function must be switched ON before enabling any of the following services: FULLRTE, HOLD, ALTFIX, CAR, ADVISORIES/FREE TEXT, SPEEDS, XTIME. The following hierarchies exist within Full Service functionality:

- The FULL RTE switch must be turned ON to enable ALTFIX, HOLD, and CAR.
- The Speed Service tie-off which must be turned ON to enable CPDLC Crossing Time Uplink Service (XTIME).

The ROUTES function, when disabled, will disable all uplink/downlink route clearance functions that are supported by Initial Services and Full Services. The Initial Services route clearance function includes the following uplink and downlink messages: UM74, UM79, UM80, UM83, and DM22. A separate tie-off was created to enable/disable UM83.

The ALTITUDES function, when disabled, will disable all uplink/downlink altitude clearance functions that are supported by Initial Services and Full Services, including all HOLD uplinks.

The IC function, when disabled, will disable all uplink/downlink IC functions that are supported by Initial Services.

Appendix A: Communication Information Messages from ATC

The examples below include CPDLC error processing that include Cause, Result, and resultant error messages. The tables below include both ground and aircraft error processing. The tables are representative of known capabilities and system behavior that will be updated as new information becomes available.

Table 2. Tower DCL Ground Error Processing

Cause	Result	ERROR Message
Received CPDLC downlink response message is not expected.	Connection with aircraft is aborted. This is viewed as a Protocol error	UM161 CPDLC End Service – No UM159 is sent.
Received downlink CPDLC message with an operationally unsupported message element/parameter.	Disregard the received message and send a CPDLC message containing message element UM169 "MESSAGE NOT SUPPORTED BY THIS ATS UNIT".	UM169 "MESSAGE NOT SUPPORTED BY THIS ATS UNIT".
Received downlink CPDLC message DM67 or DM68 as a single message element	Disregard the received message and send a CPDLC message containing message elements UM159 unexpectedData and UM169 "FREETEXT NOT SUPPORTED".	UM159 unexpectedData and UM169 "FREETEXT NOT SUPPORTED".
DM25 received with appended data	Disregard the received message and send a CPDLC message containing message element UM159 unexpectedData and a UM169 "ATSU CANNOT PROCESS DATA APPENDED TO CLEARANCE REQUEST".	UM159 unexpectedData and a UM169 "ATSU CANNOT PROCESS DATA APPENDED TO CLEARANCE REQUEST".
DM62 received with appended data that is not a DM67 Free text	Connection with aircraft is aborted.	UM161 CPDLC End Service – No UM159 is sent.
DM1 UNABLE received with appended data other than DM65, DM66 or DM67	Disregard the received message and send a CPDLC message containing message element UM159 unexpectedData	UM159 unexpectedData
DM1 UNABLE received with DM65, DM66 or DM67	Process the DM1 UNABLE but disregard the concatenated free text	Nothing will be sent back to the flight deck

Cause	Result	ERROR Message
DM25 received with a DM25 pending	Disregard the received message and send a CPDLC message containing message element UM169 "CLEARANCE REQUEST PENDING".	UM169 "CLEARANCE REQUEST PENDING".
DM25 received with a clearance awaiting a flight crew response	Disregard the received message and send a CPDLC message containing message element UM169 "CLEARANCE SENT, RESPONSE REQUIRED. IF NO CLEARANCE MESSAGE EXISTS, CONTACT ATC AND REQUEST A RESEND OF DEPARTURE CLEARANCE".	UM169 "CLEARANCE SENT, RESPONSE REQUIRED. IF NO CLEARANCE MESSAGE EXISTS, CONTACT ATC AND REQUEST A RESEND OF DEPARTURE CLEARANCE".
DM25 received with an open CONTACT ME message	Disregard the received message and send a CPDLC message containing message element UM169 “CONTACT ME: CONTACT TOWER BY VOICE WITH REQUEST”.	UM169 “CONTACT ME: CONTACT TOWER BY VOICE WITH REQUEST”.
Received a response message with a MRN that has no match	Disregard the received message and send a CPDLC message containing message element UM159 unrecognizedMsgReference Number	UM159 unrecognizedMsgReference Number
DM0, DM2, DM3, or DM63 received with appended data	Disregard the received message and send a CPDLC message containing message element UM159 unexpectedData	UM159 unexpectedData

En Route CPDLC Ground Error Processing

The following ATC uplinks may be received for review by the flight crew.

Table 3. En Route CPDLC Ground Error Processing

Item #	Information Message	Condition	Flight Crew Action
1	MESSAGE NOT DELIVERED. FREE TEXT/DUE TO REASON NOT SUPPORTED. CONTACT ATC OR RESEND REQUEST	Air Description: The Flight Crew selected an unsupported preformatted free text message or manually added free text to a request. Ground Description: Automatically appends error free text to a (UM0) UNABLE in response to a supported message containing (DM67) free text.	The FAA only accepts "Due To Weather or Performance" as additional reasons/information. Flight crews should avoid appending any other additional reasons or additional information such as free text.
2	RESPONSE/REPORT RECEIVED. FREE TEXT NOT SHOWN TO ATC	Air Description: The Flight Crew selected a preformatted free text message or manually added free text to a response or report downlink (excluding UNABLE). Ground Description: Automatically uplinked upon the receipt of (DM0) WILCO, (DM2) STANDBY, (DM3) ROGER, or (DM38) ASSIGNED ALTITUDE containing (DM67) free text.	The FAA does not accept any additional reasons/information with responses and reports, Flight crews should avoid all additional information such as free text when downlinking responses and reports.
3	UNABLE RECEIVED. FREE TEXT/DUE TO REASON NOT SHOWN TO ATC	Air Description: The Flight Crew selected a preformatted free text message or manually added free text to an UNABLE response. Ground Description: Automatically uplinked upon the receipt of (DM1) UNABLE containing (DM67) Free text.	The FAA only accepts "Due To Weather or Performance" as additional reasons/information, Flight crews should avoid all other additional reject reasons or additional information such as free text.

Item #	Information Message	Condition	Flight Crew Action
4	DOWNLINK DELAYED – USE VOICE	Air Description: If a message received by the ground system has a timestamp between 2 and 10 minutes older than the current ground system time, the message is rejected with UNABLE automatically. Ground Description: Appended to (UM0) UNABLE and automatically uplinked when a Normal (non-emergency) message is received within the adapted latency value range (120 to 600 seconds). Note: If a message older than 10 minutes is received by the ground system, it is discarded and no message is uplinked in response.	If desired, flight crew should contact ATC via voice for their ATC request.
5	REQUEST AGAIN WITH NEXT ATC UNIT	Air Description: CPDLC message will be appended with an UNABLE (UM0) and automatically uplinked for open messages. Ground Description: Appended to (UM0) UNABLE and automatically uplinked for open messages before uplinking a TOC, when: • An inter-facility TOC is uplinked, or • An intra-facility TOC is uplinked and the message has already been forwarded once.	Make request with the next ATC controller.

Item #	Information Message	Condition	Flight Crew Action
6	YOUR LAST CPDLC RESPONSE NOT EXPECTED. CONTACT ATC BY VOICE	Air Description: The controller has cancelled an uplinked CPDLC message. Ground Description: Sent when (DM0) WILCO received to controller 'Cancelled' (locally closed) uplink. Since it is expected that a controller cancelling an uplink includes voice instructions to the flight crew to reject the uplink, the expected flight crew response is UNABLE. When the UNABLE is received in this scenario, it is simply processed and discarded. Note: This message will not be sent if the WILCO is in response to a TOC on which the controller used the CLEANUP+RELEASE function.	The controller and flight crew should coordinate any related ATC messages closed by the ground system via voice.
7	YOUR LAST CPDLC RESPONSE NOT EXPECTED. CONTACT ATC BY VOICE	Air Description: The ground system has received a CPDLC message, but does not match any corresponding CPDLC message. Ground Description: Automatically uplinked when a response downlink message contains a MRN that does not match the MIN of an open uplink. This does not apply to the case where the ground receives a response message to an uplink that the controller or the system have cancelled.	Contact ATC via voice.

Item #	Information Message	Condition	Flight Crew Action
8	INVALID DATA – DOWNLINK REJECTED. RESEND OR CONTACT BY VOICE	Air Description: none Ground Description: Appended to (UM0) UNABLE and automatically uplinked when the MIN of a received flight crew request matches the MIN of an open flight crew request. However, if the entire contents of the message are determined to be duplicate of an open message, the duplicate message is SAR recorded and discarded (not displayed), and no message is uplinked in response.	Resend message with correct information or contact ATC via voice.
9	DOWNLINK REJECTED - OPEN REQUEST OF SAME TYPE EXISTS	Air Description: A flight crew request is open, and the flight crew downlinks another request of the same type. Ground Description: Appended to (UM0) UNABLE and automatically uplinked upon the receipt of a non-emergency message when an open message of the same message type exists.	Flight crew should contact ATC via voice to coordinate related ATC request.

Item #	Information Message	Condition	Flight Crew Action
10	INVALID MESSAGE FORMAT	Air Description: Message has been rejected and is appended with an Unable response. Ground Description: Appended to (UM0) UNABLE and automatically uplinked when invalid data or data in an invalid format exists in a non-emergency message. Examples: A Direct To [position] request containing a Fix Radial Distance (FRD) with a distance value greater than 700NM. An Altitude request containing other than QNH Feet or Flight Level. An Altitude request containing a FT altitude type but containing an altitude above 18,000 feet. An Altitude request containing a Flight Level altitude field type but containing an altitude below FL180.	Flight crews should review downlinked request and determine if the format is correct for the CPDLC request, otherwise contact ATC if desired.
11	CONTACT ATC - RESPONSE RECEIVED FOR AN UNKNOWN MESSAGE	Air Description: The ground system has received a CPDLC message, but the downlink message reference number is not included. Ground Description: Automatically uplinked when the ground system receives a downlink message containing valid response element (DM0-DM3, DM63), but without an MRN.	Flight crew should contact ATC via voice.

Item #	Information Message	Condition	Flight Crew Action
12	DOWNLINK MESSAGE NOT SUPPORTED	Air Description: Message has been rejected and is appended with an UNABLE response. Either the message is not supported or an acceptable message type may contain unsupported information. Ground Description: Appended to (UM0) UNABLE and automatically uplinked in response to an unsupported message.	If desired, flight crew should contact ATC via voice for their ATC request.
13	CPDLC NOT IN USE UNTIL FURTHER NOTIFICATION	Air Description: Controller / flight crew CPDLC communications is currently not available. The message has been rejected and is appended with an UNABLE response Ground Description: Appended to (UM0) UNABLE and automatically uplinked from National. To reject a non-emergency message received when National is the LDA. To close an open message when that ARTCC disables CPDLC.	If desired, flight crew should contact ATC via voice for their ATC request.
14	RESPONSE TO MESSAGE NOT SHOWN TO ATC – CONTACT ATC BY VOICE	Air Description: The Flight Crew selected a response that is not expected/supported by the FAA. Ground Description: Free text uplink sent when the response downlink received for an uplinked message is not expected/not supported.	The FAA only accepts “Due To Weather or Performance” as additional reasons/information, Flight crews should avoid all other additional reject reasons or additional information such as free text.

Item #	Information Message	Condition	Flight Crew Action
15	ROUTE REQUEST NOT AVAILABLE UNTIL FURTHER ADVISED. CONTACT ATC BY VOICE	Air Description: If a route request is received by the ground system, and Routes have been disabled in the ground system, the request is auto-rejected with UNABLE. Ground Description: Appended to (UM0) UNABLE and automatically uplinked when Routes are disabled in the ground system.	The flight crew should contact ATC for route requests.
16	ALTITUDE REQUEST NOT AVAILABLE UNTIL FURTHER ADVISED. CONTACT ATC BY VOICE	Air Description: If an altitude request is received by the ground system, and Altitudes have been disabled in the ground system, the request is auto-rejected with UNABLE. Ground Description: Appended to (UM0) UNABLE and automatically uplinked when Routes are disabled in the ground system.	The flight crew should contact ATC for altitude requests.
17	ALTITUDE REPORT NOT SHOWN TO ATC. CONTACT ATC BY VOICE	Air Description: A flight crew downlinks an assigned altitude report while CPDLC is not being used. Ground Description: Automatically uplinked upon the receipt of (DM38) ASSIGNED ALTITUDE while the LDA resides at National.	Contact ATC via voice.
18	SPEED REPORT RECEIVED. FREE TEXT NOT SHOWN TO ATC.	Air Description: A flight crew downlinks a DM34 speed request with a freetext element included. Ground Description: Automatically uplinked to notify the flight crew that the DM34 will be processed and displayed to the controller. However, the freetext element will be discarded.	If desired, flight crew should contact ATC via voice.

Item #	Information Message	Condition	Flight Crew Action
19	INVALID ROUTE REQUEST - FULL ARRIVAL PROCEDURE / TRANSITION REQUIRED. RESEND OR CONTACT ATC BY VOICE *Future – "ROUTE REQUEST CANNOT BE PROCESSED. CONTACT ATC BY VOICE"*	Air Description: A flight crew downlinks a DM24 with a pilot requested route that contains a shortcut onto a STAR. Ground Description: Appended to (UM0) UNABLE and automatically uplinked in response to requested route containing a shortcut.	Resend request without shortcut onto STAR or contact ATC via voice.

Appendix B: CPDLC Flight Plan and Route Planning Guidance

The ICAO 2012 flight plan is now operational in the NAS and is required for CPDLC service.

The proposed FPL filing "codes" in Field 18/DAT are an optional mechanism for the user to notify FAA automation to generate a CPDLC or PDC clearance for CPDLC-enabled airports, and to determine En Route CPDLC eligibility. The codes were created to differentiate FANS 1/A and FANS 1/A+ support. At this time, there are no differences in the ground system support for either mode.

- ICAO FP codes take precedence over any other user preference mechanism, e.g., SDB
- For En Route CPDLC, ICAO FP codes are the only source of information for CPDLC eligibility
- Field 10a allows any order and is world-wide; "Z" is required in order to get to DAT/ field
- No spaces should be included in the actual DAT/ field; they are shown in Table 4 below for clarity only

Proposed codes include an optional "Fallback" Hierarchy if CPDLC service is not available at a CPDLC-enabled airport.

The FAA ground system uses ICAO 2012 FPL.

- Field 10a (Equipage) used to identify aircraft capabilities
- Field 18 (Other Information) DAT/Codes used to identify flights getting CPDLC or PDC
- Need to fill in Field 10a in order to get to Field 18 DAT/
- Field 18 DAT/ Codes will include a primary/secondary hierarchy
- "1"xxx designates preferred departure clearance delivery mechanism
- "2"xxx designates "back up" delivery mechanism

ICAO FPL preferences take priority over any other sources.

Table 4. ICAO FPL Field 10a and Field 18 DAT/Codes

User Preference	Data Comm Capability Description	ICAO 2012 Field 10a	Data Comm Field 18 DAT/ Code	Comments
PDC and CPDLC-DCL				
PDC only*	Not ACARS equipped but gets PDC via manual means.	Z	1PDC	Some aircraft are non-ACARS equipped, and 10a is a physical equipage. Still get PDC via other means (e.g., gate printer). Optional if currently getting PDC.
PDC only*	Equipped only for ACARS/PDC.	E3 Z	1PDC	Optional if currently getting PDC.
PDC only*	Equipped for ACARS/PDC and FANS but wants PDC only.	E3J3Jx or E3J4Jx Z	1PDC	Equipped for ACARS/PDC and FANS 1/A or 1/A +, and possible other capabilities (Jx).
FANS 1/A & FANS 1/A+ CPDLC-DCL	Equipped for ACARS/PDC and FANS but wants FANS 1/A or FANS 1/A+ only for CPDLC-DCL.	J3Jx or J4Jx Z	1FANS	Identifies U.S. domestic preference for FANS 1/A or FANS 1/A+ CPDLC-DCL. (No PDC)
FANS 1/A & FANS 1/A+ CPDLC-DCL/PDC	Equipped for ACARS/PDC and FANS, with primary/secondary preferences.	E3J3Jx or E3J4Jx Z	1FANS2PDC	Code number shows priority preference (e.g., CPDLC-DCL is primary preference; PDC is secondary. PDC will be used if CPDLC-DCL is unavailable.

PDC only and En Route Data Link Clearances				
FANS 1/A & FANS 1/A+ PDC	For flights authorized for en route CPDLC that have **no issues** loading a route clearance with a STAR Arrival and Transition and for PDC service only.	E3J4Jx Z	1PDCFANSE	This code is to be used to obtain PDC and CPDLC en route clearances with aircraft that have **no issues** loading a route clearance with a STAR Arrival and Transition. (No CPDLC-DCL)
FANS 1/A & FANS 1/A+ PDC	For flights authorized for en route CPDLC that have **issues** loading a route clearance with a STAR Arrival and Transition and for PDC service only.	E3J4Jx Z	1PDCFANSER	This code is to be used to obtain PDC and CPDLC en route clearances with aircraft that have **issues** loading a route clearance with a STAR Arrival and Transition. (No CPDLC-DCL)
CPDLC-DCL (No PDC) and En Route Data Link Clearances				
FANS 1/A & FANS 1/A+ CPDLC-DCL	For flights authorized for CPDLC-DCL (no PDC) and en route CPDLC that have **no issues** loading a route clearance with a STAR Arrival and Transition.	J4Jx Z	1FANSE	This code is to be used to obtain CPDLC-DCL and en route clearances with aircraft that have **no issues** loading a route clearance with a STAR Arrival and Transition. (No PDC)
FANS 1/A & FANS 1/A+ CPDLC-DCL	For flights authorized for CPDLC-DCL (no PDC) and en route CPDLC that have **issues** loading a route clearance with a STAR Arrival and Transition.	J4Jx Z	1FANSER	This code is to be used to obtain CPDLC-DCL and en route clearances with aircraft that have **issues** loading a route clearance with a STAR Arrival and Transition. (No PDC)
CPDLC-DCL (PDC secondary) and En Route Data Link Clearances				
FANS 1/A & FANS 1/A+ CPDLC-DCL/PDC	For flights authorized for CPDLC-DCL (PDC secondary) and en route CPDLC that have **no issues** loading a route clearance with a STAR Arrival and Transition	E3J4Jx Z	1FANSE2PDC	This code is to be used to obtain CPDLC-DCL and en route clearances with aircraft that have **no issues** loading a route clearance with a STAR Arrival and Transition. (PDC is secondary preference to DCL)
FANS 1/A & FANS 1/A+ CPDLC-DCL/PDC	For flights authorized for CPDLC-DCL (PDC secondary) en route CPDLC that have **issues** loading a route clearance with a STAR Arrival and Transition	E3J4Jx Z	1FANSER2PDC	This code is to be used to obtain CPDLC-DCL and en route clearances with aircraft that have **issues** loading a route clearance with a STAR Arrival and Transition. (PDC is secondary preference to DCL)
En Route Data Link Clearances ONLY				
FANS 1/A & FANS 1/A+	For flights authorized for en route CPDLC that have **no issues** loading a route clearance with a STAR Arrival and Transition	J4Jx Z	FANSE	This code is to be used to obtain CPDLC en route clearances with aircraft that have **no issues** loading a route clearance with a STAR Arrival and Transition. (No CPDLC-DCL or PDC)
FANS 1/A & FANS 1/A+	For flights authorized for en route CPDLC that have **issues** loading a route clearance with a STAR Arrival and Transition	J4Jx Z	FANSER	This code is to be used to obtain CPDLC en route clearances with aircraft that have **issues** loading a route clearance with a STAR Arrival and Transition. (No CPDLC-DCL or PDC)

* No ICAO flight plan change required if user currently gets PDC and does not want CPDLC DCL. Current PDC designation will be the default.

Additional notes:

- Field 10a may be in any order and is applicable world-wide
- Z is required to get DAT/
- No spaces in actual DAT/field

Appendix C: CPDLC Message Elements Used Within the NAS

The following message tables are a subset of the DO-258A message set implemented in CPDLC Tower and En Route services.

Table 5 shows all the uplink messages supported for Tower and En Route services.

Table 5. Uplink Messages

FANS MSG ID	FANS Message Element
UM0	UNABLE
UM1	STANDBY
UM3	ROGER
UM19	MAINTAIN [altitude]
UM20	CLIMB TO AND MAINTAIN [altitude]
UM23	DESCEND TO AND MAINTAIN [altitude]
UM30	MAINTAIN BLOCK [altitude] TO [altitude]
UM31	CLIMB TO AND MAINTAIN BLOCK [altitude] TO [altitude]
UM32	DESCEND TO AND MAINTAIN BLOCK [altitude] TO [altitude]
UM36	EXPEDITE CLIMB TO [altitude]
UM37	EXPEDITE DESCENT TO [altitude]
UM38	IMMEDIATELY CLIMB TO [altitude]
UM39	IMMEDIATELY DESCEND TO [altitude]
UM49	CROSS [position] AT AND MAINTAIN [altitude]
UM51	CROSS [position] AT [time]
UM52	CROSS [position] AT OR BEFORE [time]
UM53	CROSS [position] AT OR AFTER [time]
UM55	CROSS [position] AT [speed]
UM56	CROSS [position] AT OR LESS THAN [speed]
UM57	CROSS [position] AT OR GREATER THAN [speed]
UM61	CROSS [position] AT AND MAINTAIN [altitude] AT [speed]
UM74	PROCEED DIRECT TO [position]
UM75	WHEN ABLE PROCEED DIRECT TO [position]
UM77	AT [position] PROCEED DIRECT TO [position]
UM78	AT [altitude] PROCEED DIRECT TO [position]
UM79	CLEARED TO [position] VIA [routeclearance]

FANS MSG ID	FANS Message Element
UM80	CLEARED [routeclearance]
UM82	CLEARED TO DEVIATE UP TO [distanceoffset] [direction] OF ROUTE
UM83	AT [position] CLEARED [routeclearance]
UM91	HOLD AT [position] MAINTAIN [altitude] INBOUND TRACK [degrees] [direction] TURNS [leg type]
UM93	EXPECT FURTHER CLEARANCE AT [time]
UM106	MAINTAIN [speed]
UM108	MAINTAIN [speed] OR GREATER
UM109	MAINTAIN [speed] OR LESS
UM116	RESUME NORMAL SPEED
UM117	CONTACT [icao unit name][frequency]
UM120	MONITOR [icao unit name][frequency]
UM127	REPORT BACK ON ROUTE
UM134	CONFIRM SPEED
UM135	CONFIRM ASSIGNED ALTITUDE
UM137	CONFIRM ASSIGNED ROUTE
UM153	ALTIMETER [altimeter]
UM154	RADAR SERVICES TERMINATED
UM159	ERROR [error information]
UM160	NEXT DATA AUTHORITY [icao facility designation]
UM161	END SERVICE
UM162	SERVICE UNAVAILABLE
UM163	[icao facility designation] [tp4 table]
UM166	DUE TO TRAFFIC
UM167	DUE TO AIRSPACE RESTRICTION
UM169	[free text]
UM177	AT PILOTS DISCRETION

Table 6 shows all the downlink messages supported for Tower and En Route services.

Table 6. Downlink Messages

FANS MSG ID	FANS Message Element
DM0	WILCO
DM1	UNABLE
DM2	STANDBY
DM3	ROGER
DM6	REQUEST [altitude]
DM7	REQUEST BLOCK [altitude] TO [altitude]
DM9	REQUEST CLIMB TO [altitude]
DM10	REQUEST DESCENT TO [altitude]
DM20	REQUEST VOICE CONTACT
DM22	REQUEST DIRECT TO [position]
DM23	REQUEST [procedurename]
DM24	REQUEST [routeclearance]
DM25 (CPDLC DCL only)	REQUEST CLEARANCE
DM27	REQUEST WEATHER DEVIATION UP TO [distanceoffset] [direction] OF ROUTE
DM34	PRESENT SPEED [speed]
DM38	ASSIGNED ALTITUDE [altitude]
DM40	ASSIGNED ROUTE [routeclearance]
DM41	BACK ON ROUTE
DM55	PAN PAN PAN
DM56	MAYDAY MAYDAY MAYDAY
DM57	[remaining fuel] OF FUEL REMAINING AND [remaining souls] SOULS ON BOARD
DM58	CANCEL EMERGENCY
DM59	DIVERTING TO [position] VIA [routeclearance]
DM60	OFFSETTING [distance offset] [direction] OF ROUTE
DM61	DESCENDING TO [altitude]
DM62	ERROR [error information]
DM63	NOT CURRENT DATA AUTHORITY
DM64	[icao facility designation]

FANS MSG ID	FANS Message Element
DM65	DUE TO WEATHER
DM66	DUE TO AIRCRAFT PERFORMANCE
DM68	[free text]
DM73	[version number]
DM80	DEVIATING [distance offset] [direction] OF ROUTE

Appendix D: FAA CPDLC Acronym List

Table 7. Table of Acronyms

Acronym	Definition
ABRR	Airborne Re-route Execution
ACARS	Aircraft Communications Addressing and Reporting System
ACID	Aircraft Identification (Code)
ACK	Acknowledge
ACL	Aircraft List
ADAR/PDAR	Adapted Departure-Arrival Route/Preferential Departure-Arrival Route
ADR/PDR	Adapted Departure Route/ Preferential Departure Route
AFM	Aircraft Flight Manual
AGL	Above Ground Level
AID	Aircraft Identification
ANSP	Air Navigation Service Provider
AOC	Airline Operations Center
ARTCC	Air Route Traffic Control Centers
ASN1	Abstract Syntax Notation One
ATC	Air Traffic Control
ATOP	Advanced Technologies and Oceanic Procedures
ATS	Air Traffic Services
ATSU	Air Traffic Services Unit
CAA	Confirm Assigned Altitude
CAF	Cleared As Filed
CAR	Confirm Assigned Route
CC1	Connect Confirm Message
CDA	Current Data Authority
CDR	Coded Departure Routes
CERA	Controller-Entered Reported Altitude
CHI	Computer Human Interface
CPDLC	Controller-Pilot Data Link Communication
CR1	Connect Request Message
CSP	Communication Service Provider

Acronym	Definition
DAT	Data Application information
DCIT	Data Comm Implementation Team
DCL	Departure Clearance
DCNS	Data Communications Network Service
DLD	Data Link Dispatch
DM	Departure Message
DP	Departure Procedure
DPP	Departure Procedure information (SID/Climb via and Climb out)
DR1	Disconnect Request Message
E2E	End-to-End
EFC	Expect Further Clearance
ERAM	En Route Automation Modernization
ERR	Error indicator
FAA	Federal Aviation Administration
FANS	Future Air Navigation System
FDB	Full Data Block
FDR	Fixed Radial Distance
FIR	Flight Information Region
FLID	Flight Identification
FMC	Flight Management Computer
FMS	Flight Management System
FOC	Flight Operations Center
FPL/FP	Flight Plan
FRC	Full Route Clearance
GIM-S	Ground-Based Interval Management - Spacing
GREQ	Gate Request
HF	High Frequency
IATA	International Air Transport Association
IC	Initial Contact
ICAO	International Civil Aviation Organization
ID	Identification

Acronym	Definition
IFR	Instrument Flight Rules
IRD	Interface Requirements Document
JMS	Java Message Service
L/L	Latitude/Longitude
LTV	Latency Time Value
NAS	National Airspace System
NAT	North Atlantic Tracks
NAVAID	Navigational Aid
NDA	Next Data Authority
NEMS	NAS Enterprise Management Service
NM	Nautical Mile
PBD	Place Bearing Distance
PDC	Pre-Departure Clearance
REG	Registration
SATCOM	Satellite Communication
SDB	Subscriber Database
SID	Standard Instrument Departure
SOP	Standard Operating Procedures
STAR	Standard Terminal Arrival Route
STBY	Standby indicator
TDLS	Tower Data Link System
TFM	Traffic Flow Management
TMU	Traffic Management Unit
TOC	Transfer of Communication
TRACON	Terminal Radar Approach Control
UM	Uplink Message
UTC	Universal Time Coordinated
VDL	VHF Data Link
VFR	Visual Flight Rules
VHF	Very High Frequency
XML	Extensible Markup Language

Appendix E: Watchlist Overview

Overview

The Data Comm En Route Watchlist is used to track aircraft that are participating in US Domestic En Route CPDLC to ensure that aircraft operators are using the correct media and addressing issues with individual aircraft to ensure high performing En Route CPDLC service.

Criteria to be added to watchlist

The following criteria are used for watchlist additions:

1. **Site has documented 3 tickets (any issue) with a flight = "Repeat Offender"**
    a. Associated Automation Issue Management System (AIMS) tickets
    b. These tickets are submitted when a problem is encountered with CPDLC
2. **Alternate Media Usage: (2) instances within 30 days = "Alternate Media Usage"**
    a. An "instance" is defined as an individual tail using POA and/or SAT >50% of the flight, counted by each separate flight within a 24hr period.
3. **Any known Avionics Issue = "Known Issue"**
    a. These avionics issues are known to the program to cause issues with en route CPDLC
    b. i.e. VDR Deafness, Pegasus I, etc.
4. **Tail exhibits poor performance as an outlier to the rest of the operation = "Outlier"**

Should a tail, that is already on the watchlist, meet any of the above criteria, that tail will be added to the blocked list.