NAS Data Communications Guide

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### Change History

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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 some aircraft) 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)](image1)

![Figure 2. Function Execute Keys (Boeing)](image2)

![Figure 3. A320 & A330/A340 Controls and Indications for FANS (Airbus)](image3)
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).

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 option is available 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 session, or the CPDLC session 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 session is detected, the flight crew should terminate the session and then initiate a new logon with KUSA when appropriate.
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.
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

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 that you have lost your CPDLC connection and if any questions arise concerning your 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 session 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”.

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**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](image)

**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](image)

**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. ATC OTHER REQ Page on A350/380](image)
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 session in cases where the clearance cannot be generated by the ground system. In these cases, after the session 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 session will remain in a CONTACT ME state. While a CONTACT ME free text message is open, 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 session is in the CONTACT ME state. The session 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
Data Communications Implementation Team (DCIT):
(CPDLC) NAS Data Communications Guide

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

**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 / STANDBY, as 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 / STANDBY, as 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 session will be retained by the ground system until a CPDLC session 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 crew 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, a 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 a 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 Figures 11-12). *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 TORN to MCB is the modified route and may be loaded into the FMS via the LOAD prompt. The DP DARTZ3.TORN 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.

![Example for Boeing Aircraft]

![Example for Airbus Aircraft]

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 a 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 a FMS execute function
- Based on company procedures, either Accept/WILCO or Reject/UNABLE the revised clearance

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**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 a 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 in to the FMS.
- AFTER DORET “REST OF ROUTE UNCHANGED” indicates to the flight crew that they are cleared via their original/previous 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 clearance delivery via voice to discuss any discrepancies.

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.

Figure 17. Depiction of a Revised Departure Clearance – Non-Loadable Route Information
Chapter 7. En Route Airspace CPDLC Communications and Session Management

7.1 Takeoff with a CPDLC Session Established from a TDLS Airport

After departure from an airport with CPDLC DCL services and the aircraft had a CPDLC session while on the ground, the CPDLC session will be maintained by the FAA ground system while climbing through TRACON airspace until the aircraft enters En Route airspace. Once the aircraft has entered En Route ATC airspace and the controller has CPDLC turned on at their workstation 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 Session Establishment – En Route Operations

7.2.1 Takeoff without a CPDLC session 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 session.

7.2.2 Automatic CPDLC Session Initiation

In general, when departing a U.S. airport without a session and entering En Route airspace, the earliest a CPDLC session 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 session 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 session with an airborne IFR aircraft that does not already have a session using the following triggers and conditions:

a) Triggers for automatic CPDLC session 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 session establishment altitude to above
   v) receipt of a transfer initiate message

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

   i) the aircraft has a correlated logon, and
   ii) the aircraft is paired, and
   iii) the aircraft has surveillance track data, and
iv) the aircraft trajectory predicted altitude is above a locally adapted session 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 session 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 session 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](image1)

![Example on Boeing aircraft with U13](image2)

**Figure 18. Automated CPDLC Confirmation to KUSA message**

The flight crew’s ROGER downlink response will confirm that the ground system is indeed the CDA. If a ROGER response is not received or no response is received, the UM169 by ground automation will be retried.

If the aircraft responds with DM63 NOT CURRENT DATA AUTHORITY, the session is designated an NDA session. 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 session 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 session.

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., 1 retry).

Example: After the first free text uplink is sent, if no response is received (e.g., timeout), the uplink is retried 1 more time. 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 session 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 session 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 session 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 CPDL NOT IN USE UNTIL FURTHER NOTIFICATION.

7.4 En Route Transfer of Communications (TOC) using CPDLC

TOC messages into another facility (e.g., ARTCC/TRACON), as well as TOC messages into another sector within the same facility (e.g., sector/sector), will always use the CONTACT message.

7.4.1 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.

7.4.2 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) If the open downlink has not been transferred from one controller to another once already and the transfer is intra-facility, the open downlink will be transferred to the new controller.

      ii) If that downlink had already been transferred once or if the transfer is to another facility, 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 Session 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, session termination will occur as follows:

   i) If the aircraft is above an adapted altitude, the session 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 session termination will occur as follows:

   i) If the aircraft is above an adapted altitude, and within an adapted distance of its destination, the session 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 session 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 session termination.

7.4.3 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 (some airplanes) 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. For inter-facility transfers, the receiving controller will also verify the Mode C of the aircraft.

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 and send it to the assigned ATC controller. 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 message and send it to the aircraft. Upon receipt of the Contact ATC message the flight crew should review the uplink message, select the ATC frequency as appropriate, 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 a NDA (CZEG) message to notify the aircraft of the identity of the next ATSU permitted to establish a CPDLC connection.
2. The aircraft initiates address forwarding and establishes a connection with the next facility (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.

Note: The aircraft system will only accept a CPDLC connection request from the ATSU specified in the NDA message e.g., CZEG.

An active CPDLC session is terminated either by controller initiated manual termination or with a CPDLC transfer of communications contact message with a corresponding end service message to start the successful CPDLC transfer. Upon termination of the active session, the CPDLC communication transfer is dependent upon the receiving CPDLC enable facility to complete a successful establishment of a CPDLC connection. Once the new connection is established then the new active CPDLC session will become the Current Data Authority (CDA) and CPDLC messaging can be continued per SOP.

The controller may terminate the active CPDLC session 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 20. 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.
Chapter 8. Vertical Navigation - Altitude and Crossing Restrictions

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 session 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 use in the PID menu when replying to a flight crew request.*

*Note: DUE TO reasons are not supported for use with a crossing restriction clearance.*

8.1 Flight Crew Altitude Requests

The following Flight crew initiated downlink altitude requests are available in En Route CPDLC services:

- **DM6** REQUEST [altitude]
- **DM9** REQUEST CLIMB TO [altitude]
- **DM10** REQUEST DESCENT TO [altitude]

*Note: 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 your aircraft design and SOP.*

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]

**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]

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]

Flight crews, upon receipt of a response to the altitude request, should review the uplinked CPDLC message using normal CPDLC procedures, and either respond with a WILCO, UNABLE, or STANDBY as appropriate. If STANDBY is selected, flight crews will still have to respond to the CPDLC message with either a WILCO or UNABLE as 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]
• UM36 EXPEDITE CLIMB TO [altitude]
• UM37 EXPEDITE DESCENT TO [altitude]
• UM38 IMMEDIATELY CLIMB TO [altitude]
• UM39 IMMEDIATELY DESCEND TO [altitude]

Note: UM17 AT PILOTS DISCRETION may be appended to uplinked messages UM19/20/23

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 work flow 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]

Upon receipt of an altitude or 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 as
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.

8.3 Confirm Assigned Altitude

When a controller requires a verification of assigned altitude, the controller may uplink a CONFIRM ASSIGNED ALTITUDE (UM135) message to the flight crew. The flight crew will display the requested report and 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.

8.4 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 settings 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”. An aircraft may be provided an altimeter setting as a stand-alone message when transiting airspace that requires its use. 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.

Figure 21. Altimeter Setting Message
Chapter 9. Re-route and Lateral Navigation

CPDLC, within the NAS, allows re-routes to be accomplished with both flight crew initiated requests and controller initiated uplinks. Flight crew initiated route requests are limited to “Direct-To-Fix” requests on the active flight plan while controllers have a range of uplinks that will be described below.

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: Not all aircraft have the capability to load information from CPDLC messages directly 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 (excluding UM74 PROCEED DIRECT TO [position]), 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 proceeded by 5 dashes and a single space and is limited to 256 characters.


- CLEARED TO SAWED VIA ROUTE CLEARANCE
- REST OF ROUTE UNCHANGED
- - - - - CLEARED TO SAWED VIA VCN SBY SAWED.
Figure 22. UM79 Route Clearance and Supplementary Route Free Text (B737 MCDU Test Bench – FAA Tech Center)

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

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

Figure 23. UM80 Full Route Clearance and Supplementary Route Free Text (B737 MCDU Test Bench – FAA Tech Center)
In the event the FAA produced route string 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.

Note: The free text route information will only contain the portion of the route that is amended, rather than the full route to the destination.

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 clearance delivery 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 Route Requests

Flight crew initiated Direct-To-Fix requests may be accomplished anytime when the flight crew has a CPDLC session 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 a Direct-To-Fix 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 proceed to the requested fix CPDLC message.

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

Once a CPDLC Proceed Direct-To-Fix message has been received, the flight crew responds to the clearance with a WILCO, immediately loads the clearance into the FMS and proceeds to navigate directly to the cleared fix per the uplinked CPDLC ATC clearance. If a controller is unable to approve a clearance request, a “Due To” response may be appended to the clearance for flight crew awareness.
9.2 Controller Initiated Route Uplinks

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]
- UM79 CLEARED TO [position] VIA [route clearance]
- UM80 CLEARED [route clearance]
- UM83 AT [position] CLEARED [route clearance] (currently adapted off/ unavailable)

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 FLOW MANAGEMENT REROUTE message may be prepended to uplinked route clearances that have been passed to the controller from the ARTCC Traffic Management Unit (TMU).

9.3 Direct-To-Fix CPDLC Uplink

When required to amend a flight’s trajectory 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:

- ATC uplinks the clearance UM74 PROCEED DIRECT TO [position] to the aircraft.

Figure 24. Direct to Fix Diagram
• The flight crew responds to the clearance with DM0 WILCO, immediately loads the clearance into the FMC and proceeds direct to the cleared direct-to fix.

9.4 Complex Route Uplink

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 the 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. ATC route amendments using UM79, UM80 and UM83 (when used) message elements are subject to the General Pilot Response Timeout parameter (e.g., 3 min).

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 as appropriate. This may include wind information, performance, airport/alternate information and predicted fuel parameters depending on your aircraft type. Flight crews should use their company approved Standard Operating Procedures to reenter FMS required data as 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.

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

![Complex Clearance Diagram](image)

- 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 in the FMS may be lost for waypoints A, B, C, D, waypoints X, Y do not contain any forecast weather data, forecast weather data for waypoints E, F, …. remains intact.
• 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:

  o 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.

![Figure 26. Clearance Uplink with Free Text Arrival – DAT Code 1FANSER2PDC or FANSER Example](image)

- Aircraft **without** route loading issues will receive a full UM80 loadable route when applicable. To support those 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.

• ATC uplinks the clearance AT [C] CLEARED [X Y E F ...Dest] to the aircraft using UMB3 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 DM0 WILCO or DM1 UNABLE, as appropriate using approved Standard Operating Procedures

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 27. 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 in the FMS is lost for waypoints A, B, C, and D. Waypoints X, and Y do not contain any forecast weather data. Forecast weather data for waypoints E, F, etc., remains intact.*

- 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.
Figure 28. Clearance Uplink with Free Text Arrival – DAT Code 1FANSE2PDC or FANSE
Example

- Aircraft without route loading issues will receive a full UM80 loadable route when applicable. To support those 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.
- 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 DM0 WILCO or DM1 UNABLE, as appropriate using approved Standard Operating Procedures.
Chapter 10. 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 session 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.
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 1. Tower DCL Ground Error Processing

<table>
<thead>
<tr>
<th>Cause</th>
<th>Result</th>
<th>ERROR Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Received CPDLC downlink response message is not expected.</td>
<td>Session with aircraft is aborted.</td>
<td>UM161 CPDLC End Service – No UM159 is sent.</td>
</tr>
<tr>
<td>Received downlink CPDLC message with an operationally unsupported message element/parameter.</td>
<td>Disregard the received message and send a CPDLC message containing message element UM169 &quot;MESSAGE NOT SUPPORTED BY THIS ATS UNIT&quot;.</td>
<td>UM169 &quot;MESSAGE NOT SUPPORTED BY THIS ATS UNIT&quot;.</td>
</tr>
<tr>
<td>Received downlink CPDLC message DM67 or DM68 as a single message element</td>
<td>Disregard the received message and send a CPDLC message containing message elements UM159 unexpectedData and UM169 &quot;FREETEXT NOT SUPPORTED&quot;.</td>
<td>UM159 unexpectedData and UM169 &quot;FREETEXT NOT SUPPORTED&quot;.</td>
</tr>
<tr>
<td>DM25 received with appended data</td>
<td>Disregard the received message and send a CPDLC message containing message element UM159 unexpectedData and a UM169 &quot;ATSU CANNOT PROCESS DATA APPENDED TO CLEARANCE REQUEST&quot;.</td>
<td>UM159 unexpectedData and a UM169 &quot;ATSU CANNOT PROCESS DATA APPENDED TO CLEARANCE REQUEST&quot;.</td>
</tr>
<tr>
<td>DM62 received with appended data that is not a DM67 Free text</td>
<td>Session with aircraft is aborted.</td>
<td>UM161 CPDLC End Service – No UM159 is sent.</td>
</tr>
<tr>
<td>DM1 UNABLE received with appended data other than DM65, DM66 or DM67</td>
<td>Disregard the received message and send a CPDLC message containing message element UM159 unexpectedData</td>
<td>UM159 unexpectedData</td>
</tr>
<tr>
<td>DM1 UNABLE received with DM65, DM66 or DM67</td>
<td>Process the DM1 UNABLE but disregard the concatenated free text</td>
<td>Nothing will be sent back to the flight deck</td>
</tr>
<tr>
<td>Cause</td>
<td>Result</td>
<td>ERROR Message</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>DM25 received with a DM25 pending</td>
<td>Disregard the received message and send a CPDLC message containing message element UM169 “CLEARANCE REQUEST PENDING”.</td>
<td>UM169 &quot;CLEARANCE REQUEST PENDING&quot;.</td>
</tr>
<tr>
<td>DM25 received with a clearance awaiting a flight crew response</td>
<td>Disregard the received message and send a CPDLC message containing message element UM169 &quot;CLEARANCE SENT, RESPONSE REQUIRED. IF NO CLEARANCE MESSAGE EXISTS, CONTACT ATC AND REQUEST A RESEND OF DEPARTURE CLEARANCE&quot;.</td>
<td>UM169 &quot;CLEARANCE SENT, RESPONSE REQUIRED. IF NO CLEARANCE MESSAGE EXISTS, CONTACT ATC AND REQUEST A RESEND OF DEPARTURE CLEARANCE&quot;.</td>
</tr>
<tr>
<td>DM25 received with an open CONTACT ME message</td>
<td>Disregard the received message and send a CPDLC message containing message element UM169 “CONTACT ME: CONTACT TOWER BY VOICE WITH REQUEST”.</td>
<td>UM169 “CONTACT ME: CONTACT TOWER BY VOICE WITH REQUEST”.</td>
</tr>
<tr>
<td>Received a response message with a MRN that has no match</td>
<td>Disregard the received message and send a CPDLC message containing message element UM159 unrecognizedMsgReference Number</td>
<td>UM159 unrecognizedMsgReference Number</td>
</tr>
<tr>
<td>DM0, DM2, DM3, DM63 received with appended data</td>
<td>Disregard the received message and send a CPDLC message containing message element UM159 unexpectedData</td>
<td>UM159 unexpectedData</td>
</tr>
</tbody>
</table>
En Route CPDLC Ground Error Processing

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

Table 2. En Route CPDLC Ground Error Processing

<table>
<thead>
<tr>
<th>Item #</th>
<th>Information Message</th>
<th>Condition</th>
<th>Flight Crew Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MESSAGE NOT DELIVERED. FREE TEXT/DUE TO REASON NOT SUPPORTED. CONTACT ATC OR RESEND REQUEST</td>
<td>Air Description: The Flight Crew selected a preformatted free text message or manually added free text to a request with no unsupported message elements by the FAA. Ground Description: Automatically appends error free text to a UM0 UNABLE in response to a supported message containing DM67 free text.</td>
<td>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.</td>
</tr>
<tr>
<td>2</td>
<td>UNABLE RECEIVED. FREE TEXT/DUE TO REASON NOT SHOWN TO ATC</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td>3</td>
<td>DOWNLINK DELAYED – USE VOICE</td>
<td>Air Description: If a message is received by the ground system greater than 2 minutes old than the current ground system time, the message is Rejected/UNABLEd automatically. Ground Description: Appended to UM0) UNABLE (UM0) and automatically uplinked when a Normal (non-emergency) message is received after the adapted latency value (120 seconds).</td>
<td>If desired, flight crew should contact ATC via voice for their ATC request.</td>
</tr>
</tbody>
</table>
### Table 2. En Route CPDLC Ground Error Processing

<table>
<thead>
<tr>
<th>Item #</th>
<th>Information Message</th>
<th>Condition</th>
<th>Flight Crew Action</th>
</tr>
</thead>
</table>
| 4      | REQUEST AGAIN WITH NEXT ATC UNIT                         | Air Description: CPDLC message will be appended with an UNABLE (U0) and automatically uplinked for open messages.  
Ground Description: Appended to (U0) 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.                                      |
| 5      | MESSAGE CANCELLED BY ATC – CONTACT ATC BY VOICE          | Air Description: The controller has canceled an uplinked CPDLC message.  
Ground Description: Sent when (DM0) WILCO received to controller 'Canceled' (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. | The controller and flight crew should coordinate any related ATC messages closed by the ground system via voice. |
Table 2. En Route CPDLC Ground Error Processing

<table>
<thead>
<tr>
<th>Item #</th>
<th>Information Message</th>
<th>Condition</th>
<th>Flight Crew Action</th>
</tr>
</thead>
</table>
| 6      | INVALID DATA – DOWNLINK REJECTED. RESEND OR CONTACT ATC BY VOICE | Air Description: none  
Ground Description: Appended to (UM0) UNABLE and automatically uplinked when the MIN of a message matches the MIN of an open message. If the entire contents of the message are determined to be duplicate of an open message, the duplicate message will be SAR recorded and discarded (not displayed). | Resend message with correct information or contact ATC via voice. |
| 7      | 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. |
<table>
<thead>
<tr>
<th>Item #</th>
<th>Information Message</th>
<th>Condition</th>
<th>Flight Crew Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>INVALID MESSAGE FORMAT</td>
<td>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... This should be exceedingly rare. 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.</td>
<td>Flight crews should review PID and determine if the format is correct for the CPDLC request, otherwise contact ATC if desired.</td>
</tr>
<tr>
<td>9</td>
<td>CONTACT ATC - RESPONSE RECEIVED FOR AN UNKNOWN MESSAGE</td>
<td>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.</td>
<td>Flight crew should contact ATC via voice.</td>
</tr>
<tr>
<td>Item #</td>
<td>Information Message</td>
<td>Condition</td>
<td>Flight Crew Action</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>10</td>
<td>DOWNLINK MESSAGE NOT SUPPORTED</td>
<td>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 such as free text. Ground Description: Appended to (UM0) UNABLE and automatically uplinked in response to an unsupported message.</td>
<td>If desired, flight crew should contact ATC via voice for their ATC request.</td>
</tr>
<tr>
<td>11</td>
<td>CPDLC NOT IN USE UNTIL FURTHER NOTIFICATION</td>
<td>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.</td>
<td>If desired, flight crew should contact ATC via voice for their ATC request.</td>
</tr>
</tbody>
</table>
Table 2. En Route CPDLC Ground Error Processing

<table>
<thead>
<tr>
<th>Item #</th>
<th>Information Message</th>
<th>Condition</th>
<th>Flight Crew Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>CONTACT ATC - RESPONSE RECEIVED FOR AN UNKNOWN MESSAGE</td>
<td>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 canceled.</td>
<td>Contact ATC via voice.</td>
</tr>
<tr>
<td>13</td>
<td>DOWNLINK RESPONSE NOT SUPPORTED – CONTACT ATC BY VOICE</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td>14</td>
<td>REQUEST DIRECT TO FIX IS NOT AVAILABLE UNTIL FURTHER ADVISED</td>
<td>Air Description: If a route request is received by the ground system, and Routes has been disabled on the ground, the request is auto UNABLEed. Ground Description: Appended to (UM0) UNABLE and automatically uplinked when Routes are disabled on the ground</td>
<td>The flight crew should contact ATC for route requests</td>
</tr>
</tbody>
</table>
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 3 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 3. ICAO FPL Field 10a and Field 18 DAT/Codes

<table>
<thead>
<tr>
<th>User Preference</th>
<th>Data Comm Capability Description</th>
<th>ICAO 2012 Field 10a</th>
<th>Data Comm Field 18 DAT/Code</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PDC and CPDLC DCL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDC only*</td>
<td>Not ACARS equipped but gets PDC via manual means.</td>
<td>Z</td>
<td>1PDC</td>
<td>Some aircraft are non-ACARS equipped, and 10a is physical equipage. Still get PDC via other means (e.g., gate printer). Optional if currently getting PDC.</td>
</tr>
<tr>
<td>PDC only*</td>
<td>Equipped only for ACARS/PDC.</td>
<td>E3Z</td>
<td>1PDC</td>
<td>Optional if currently getting PDC.</td>
</tr>
<tr>
<td>PDC only*</td>
<td>Equipped for ACARS/PDC and FANS but wants PDC only.</td>
<td>E3J4xZ</td>
<td>1PDC</td>
<td>Equipped for ACARS/PDC and FANS 1/A or 1/A+, and possibly other capabilities (Jx).</td>
</tr>
<tr>
<td>FANS 1/A &amp; FANS 1/A+ CPDLC DCL only</td>
<td>Equipped for ACARS/PDC and FANS but wants FANS 1/A or FANS 1/A+ only for CPDLC DCL.</td>
<td>E3J4xZ</td>
<td>1FANS2PDC</td>
<td>Identifies US domestic preference for FANS 1/A or FANS 1/A+ DCL. Code number shows priority preference, (e.g., DCL is primary preference; PDC is secondary that will be used if primary is unavailable and feasible).</td>
</tr>
<tr>
<td>FANS 1/A &amp; FANS 1/A+ CPDLC DCL/PDC</td>
<td>Equipped for ACARS/PDC and FANS, with primary/secondary preferences.</td>
<td>E3J4xZ</td>
<td>1FANS3PDC</td>
<td></td>
</tr>
<tr>
<td><strong>PDC Only and En Route Data Link Clearances</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FANS 1/A &amp; FANS 1/A+ No En Route UMB0 Load Issues</td>
<td>For flights authorized for en route data link with no UMB0 load issues and for PDC service only.</td>
<td>E3J4xZ</td>
<td>1PDCFANSE</td>
<td>This code is to be used to obtain PDC and CPDLC en route clearances with aircraft that have no en route UMB0 load issues. (No Tower CPDLC DCL)</td>
</tr>
<tr>
<td>FANS 1/A &amp; FANS 1/A+ With En Route UMB0 Load Issues</td>
<td>For flights authorized for en route data link with UMB0 load issues and for PDC service only.</td>
<td>E3J4xZ</td>
<td>1PDCFANSER</td>
<td>This code is to be used to obtain a PDC and CPDLC en route clearances with aircraft that have en route UMB0 load issues. (No Tower CPDLC DCL)</td>
</tr>
<tr>
<td><strong>PDC, DCL, and En Route Data Link Clearances</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FANS 1/A &amp; FANS 1/A+ No En Route UMB0 Load Issues</td>
<td>For flights authorized for en route data link with no UMB0 load issues, as well as for ACARS/PDC and CPDLC DCL with primary/secondary preferences.</td>
<td>E3J4xZ</td>
<td>1FANS2PDC</td>
<td>This code is to be used to obtain CPDLC DCL and en route clearances with aircraft that have no UMB0 load issues; PDC is secondary that will be used if primary is unavailable and if feasible.</td>
</tr>
<tr>
<td>FANS 1/A &amp; FANS 1/A+ With En Route UMB0 Load Issues</td>
<td>For flights authorized for en route Data Comm with UMB0 load issues, as well as for ACARS/PDC and CPDLC DCL with primary/secondary preferences.</td>
<td>E3J4xZ</td>
<td>1FANS3PDC</td>
<td></td>
</tr>
<tr>
<td><strong>CPDLC DCL Only and En Route Data Link Clearances</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FANS 1/A &amp; FANS 1/A+ No En Route UMB0 Load Issues</td>
<td>For flights authorized for en route data link with no UMB0 load issues, as well as for CPDLC DCL service.</td>
<td>J4xZ</td>
<td>1FANSE</td>
<td>This code is to be used to obtain CPDLC DCL and en route clearances with aircraft that have UMB0 load issues. (No Tower PDC)</td>
</tr>
<tr>
<td>FANS 1/A &amp; FANS 1/A+ With En Route UMB0 Load Issues</td>
<td>For flights authorized for en route Data Comm with UMB0 load issues, as well as for CPDLC DCL service.</td>
<td>J4xZ</td>
<td>1FANSE</td>
<td></td>
</tr>
<tr>
<td><strong>En Route Data Link Clearances ONLY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FANS 1/A &amp; FANS 1/A+ No En Route UMB0 Load Issues</td>
<td>For flights authorized for En Route Data Comm with no UMB0 load issues.</td>
<td>J4xZ</td>
<td>FANSE</td>
<td>This code is to be used to obtain CPDLC en route clearances with aircraft that have UMB0 load issues. (No Tower CPDLC DCL or PDC)</td>
</tr>
<tr>
<td>FANS 1/A &amp; FANS 1/A+ With En Route UMB0 Load Issues</td>
<td>For flights authorized for en route data link with UMB0 load issues.</td>
<td>J4xZ</td>
<td>FANSE</td>
<td></td>
</tr>
</tbody>
</table>

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

April 3, 2019
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 4 shows all of the uplink messages planned for Tower and En Route services.

<table>
<thead>
<tr>
<th>FANS MSG ID</th>
<th>FANS Message Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>UM0</td>
<td>UNABLE</td>
</tr>
<tr>
<td>UM1</td>
<td>STANDBY</td>
</tr>
<tr>
<td>UM3</td>
<td>ROGER</td>
</tr>
<tr>
<td>UM19</td>
<td>MAINTAIN [altitude]</td>
</tr>
<tr>
<td>UM20</td>
<td>CLIMB TO AND MAINTAIN [altitude]</td>
</tr>
<tr>
<td>UM23</td>
<td>DESCEND TO AND MAINTAIN [altitude]</td>
</tr>
<tr>
<td>UM36</td>
<td>EXPEDITE CLIMB TO [altitude]</td>
</tr>
<tr>
<td>UM37</td>
<td>EXPEDITE DESCENT TO [altitude]</td>
</tr>
<tr>
<td>UM38</td>
<td>IMMEDIATELY CLIMB TO [altitude]</td>
</tr>
<tr>
<td>UM39</td>
<td>IMMEDIATELY DESCEND TO [altitude]</td>
</tr>
<tr>
<td>UM49</td>
<td>CROSS [position] AT AND MAINTAIN [altitude]</td>
</tr>
<tr>
<td>UM61</td>
<td>CROSS [position] AT AND MAINTAIN [altitude] AT [speed]</td>
</tr>
<tr>
<td>UM74</td>
<td>PROCEED DIRECT TO [position]</td>
</tr>
<tr>
<td>UM79</td>
<td>CLEARED TO [position] VIA [route clearance]</td>
</tr>
<tr>
<td>UM80</td>
<td>CLEARED [route clearance]</td>
</tr>
<tr>
<td>UM83</td>
<td>AT [position] CLEARED [route clearance]</td>
</tr>
<tr>
<td>UM117</td>
<td>CONTACT [icao unit name][frequency]</td>
</tr>
<tr>
<td>UM120</td>
<td>MONITOR [icao unit name][frequency]</td>
</tr>
<tr>
<td>UM135</td>
<td>CONFIRM ASSIGNED ALTITUDE</td>
</tr>
<tr>
<td>UM153</td>
<td>ALTIMETER [altimeter]</td>
</tr>
<tr>
<td>UM159</td>
<td>ERROR [error information]</td>
</tr>
<tr>
<td>UM160</td>
<td>NEXT DATA AUTHORITY [icao facility designation]</td>
</tr>
<tr>
<td>UM161</td>
<td>END SERVICE</td>
</tr>
<tr>
<td>UM162</td>
<td>SERVICE UNAVAILABLE</td>
</tr>
<tr>
<td>UM163</td>
<td>[icao facility designation] [tp4 table]</td>
</tr>
<tr>
<td>UM166</td>
<td>DUE TO TRAFFIC</td>
</tr>
</tbody>
</table>
Data Communications Implementation Team (DCIT): (CPDLC) NAS Data Communications Guide

Table 4. Uplink Messages

<table>
<thead>
<tr>
<th>FANS MSG ID</th>
<th>FANS Message Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>UM167</td>
<td>DUE TO AIRSPACE RESTRICTION</td>
</tr>
<tr>
<td>UM169</td>
<td>[free text]</td>
</tr>
<tr>
<td>UM177</td>
<td>AT PILOTS DISCRETION</td>
</tr>
</tbody>
</table>

Table 5 shows all of the downlink messages planned for Tower and En Route services.

Table 5. Downlink Messages

<table>
<thead>
<tr>
<th>FANS MSG ID</th>
<th>FANS Message Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM0</td>
<td>WILCO</td>
</tr>
<tr>
<td>DM1</td>
<td>UNABLE</td>
</tr>
<tr>
<td>DM2</td>
<td>STANDBY</td>
</tr>
<tr>
<td>DM3</td>
<td>ROGER</td>
</tr>
<tr>
<td>DM6</td>
<td>REQUEST [altitude]</td>
</tr>
<tr>
<td>DM9</td>
<td>REQUEST CLimb TO [altitude]</td>
</tr>
<tr>
<td>DM10</td>
<td>REQUEST DESCENT TO [altitude]</td>
</tr>
<tr>
<td>DM20</td>
<td>REQUEST VOICE CONTACT</td>
</tr>
<tr>
<td>DM22</td>
<td>REQUEST DIRECT TO [position]</td>
</tr>
<tr>
<td>DM25</td>
<td>REQUEST CLEARANCE</td>
</tr>
<tr>
<td>DM38</td>
<td>ASSIGNED ALTITUDE [altitude]</td>
</tr>
<tr>
<td>DM55</td>
<td>PAN PAN PAN</td>
</tr>
<tr>
<td>DM56</td>
<td>MAYDAY MAYDAY MAYDAY</td>
</tr>
<tr>
<td>DM57</td>
<td>[remaining fuel] OF FUEL REMAINING AND [remaining souls] SOULS ON BOARD</td>
</tr>
<tr>
<td>DM58</td>
<td>CANCEL EMERGENCY</td>
</tr>
<tr>
<td>DM59</td>
<td>DIVERTING TO [position] VIA [route clearance]</td>
</tr>
<tr>
<td>DM60</td>
<td>OFFSETTING [distance offset] [direction] OF ROUTE</td>
</tr>
<tr>
<td>DM61</td>
<td>DESCENDING TO [altitude]</td>
</tr>
<tr>
<td>DM62</td>
<td>ERROR [error information]</td>
</tr>
<tr>
<td>DM63</td>
<td>NOT CURRENT DATA AUTHORITY</td>
</tr>
<tr>
<td>DM64</td>
<td>[icao facility designation]</td>
</tr>
<tr>
<td>DM65</td>
<td>DUE TO WEATHER</td>
</tr>
<tr>
<td>DM66</td>
<td>DUE TO AIRCRAFT PERFORMANCE</td>
</tr>
</tbody>
</table>
### Table 5. Downlink Messages

<table>
<thead>
<tr>
<th>FANS MSG ID</th>
<th>FANS Message Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM68</td>
<td>[free text]</td>
</tr>
<tr>
<td>DM73</td>
<td>[version number]</td>
</tr>
<tr>
<td>DM80</td>
<td>DEVIATING [distance offset] [direction] OF ROUTE</td>
</tr>
</tbody>
</table>
### Table 6. Table of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABRR</td>
<td>Airborne Re-route Execution</td>
</tr>
<tr>
<td>ACARS</td>
<td>Aircraft Communications Addressing and Reporting System</td>
</tr>
<tr>
<td>ACID</td>
<td>Aircraft Identification (Code)</td>
</tr>
<tr>
<td>ACK</td>
<td>Acknowledge</td>
</tr>
<tr>
<td>ACL</td>
<td>Access Control List</td>
</tr>
<tr>
<td>ADAR/PDAR</td>
<td>Adapted Departure-Arrival Route/Preferential Departure-Arrival Route</td>
</tr>
<tr>
<td>ADR/PDR</td>
<td>Adapted Departure Route/ Preferential Departure Route</td>
</tr>
<tr>
<td>AFM</td>
<td>Aircraft Flight Manual</td>
</tr>
<tr>
<td>AGL</td>
<td>Above Ground Level</td>
</tr>
<tr>
<td>AID</td>
<td>Aircraft Identification</td>
</tr>
<tr>
<td>ANSP</td>
<td>Air Navigation Service Provider</td>
</tr>
<tr>
<td>AOC</td>
<td>Airline Operations Center</td>
</tr>
<tr>
<td>ARTCC</td>
<td>Air Route Traffic Control Centers</td>
</tr>
<tr>
<td>ASN1</td>
<td>Abstract Syntax Notation One</td>
</tr>
<tr>
<td>ATC</td>
<td>Air Traffic Control</td>
</tr>
<tr>
<td>ATOP</td>
<td>Advanced Technologies and Oceanic Procedures</td>
</tr>
<tr>
<td>ATS</td>
<td>Air Traffic Services</td>
</tr>
<tr>
<td>ATSU</td>
<td>Air Traffic Services Unit</td>
</tr>
<tr>
<td>CAA</td>
<td>Confirm Assigned Altitude</td>
</tr>
<tr>
<td>CAF</td>
<td>Cleared As Filed</td>
</tr>
<tr>
<td>CC1</td>
<td>Connect Confirm</td>
</tr>
<tr>
<td>CDA</td>
<td>Current Data Authority</td>
</tr>
<tr>
<td>CDR</td>
<td>Coded Departure Routes</td>
</tr>
<tr>
<td>CERA</td>
<td>Controller-Entered Reported Altitude</td>
</tr>
<tr>
<td>CHI</td>
<td>Computer Human Interface</td>
</tr>
<tr>
<td>CPDLC</td>
<td>Controller-Pilot Data Link Communication</td>
</tr>
<tr>
<td>CSP</td>
<td>Communication Service Provider</td>
</tr>
<tr>
<td>DAT</td>
<td>Data Application information</td>
</tr>
<tr>
<td>DCIT</td>
<td>Data Comm Implementation Team</td>
</tr>
<tr>
<td>Acronym</td>
<td>Definition</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>DCL</td>
<td>Departure Clearance</td>
</tr>
<tr>
<td>DCNS</td>
<td>Data Communications Network Service</td>
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<tr>
<td>DLD</td>
<td>Data Link Dispatch</td>
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<tr>
<td>DM</td>
<td>Departure Message</td>
</tr>
<tr>
<td>DP</td>
<td>Departure Procedure</td>
</tr>
<tr>
<td>DPP</td>
<td>Departure Procedure information (SiD/Climb via and Climb out)</td>
</tr>
<tr>
<td>E2E</td>
<td>End-to-End</td>
</tr>
<tr>
<td>ERAM</td>
<td>En Route Automation Modernization</td>
</tr>
<tr>
<td>ERR</td>
<td>Error indicator</td>
</tr>
<tr>
<td>FAA</td>
<td>Federal Aviation Administration</td>
</tr>
<tr>
<td>FANS</td>
<td>Future Air Navigation System</td>
</tr>
<tr>
<td>FDB</td>
<td>Flight Data Block</td>
</tr>
<tr>
<td>FDR</td>
<td>Fixed Radial Distance</td>
</tr>
<tr>
<td>FIR</td>
<td>Flight Information Region</td>
</tr>
<tr>
<td>FLID</td>
<td>Flight Identification</td>
</tr>
<tr>
<td>FMC</td>
<td>Flight Management Computer</td>
</tr>
<tr>
<td>FMS</td>
<td>Flight Management System</td>
</tr>
<tr>
<td>FOC</td>
<td>Flight Operations Center</td>
</tr>
<tr>
<td>FPL/FP</td>
<td>Flight Plan</td>
</tr>
<tr>
<td>FRC</td>
<td>Full Route Clearance</td>
</tr>
<tr>
<td>GREQ</td>
<td>Gate Request</td>
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<tr>
<td>HF</td>
<td>High Frequency</td>
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<tr>
<td>IATA</td>
<td>International Air Transport Association</td>
</tr>
<tr>
<td>IC</td>
<td>Initial Contact</td>
</tr>
<tr>
<td>ICAO</td>
<td>International Civil Aviation Organization</td>
</tr>
<tr>
<td>ID</td>
<td>Identification</td>
</tr>
<tr>
<td>IFR</td>
<td>Instrument Flight Rules</td>
</tr>
<tr>
<td>IRD</td>
<td>Interface Requirements Document</td>
</tr>
<tr>
<td>JMS</td>
<td>Java Message Service</td>
</tr>
<tr>
<td>L/L</td>
<td>Latitude/Longitude</td>
</tr>
</tbody>
</table>
### Table 6. Table of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTV</td>
<td>Latency Time Value</td>
</tr>
<tr>
<td>NAS</td>
<td>National Airspace System</td>
</tr>
<tr>
<td>NAT</td>
<td>North Atlantic Tracks</td>
</tr>
<tr>
<td>NAVAID</td>
<td>Navigational Aid</td>
</tr>
<tr>
<td>NDA</td>
<td>Next Data Authority</td>
</tr>
<tr>
<td>NEMS</td>
<td>NAS Enterprise Management Service</td>
</tr>
<tr>
<td>NM</td>
<td>Nautical Mile</td>
</tr>
<tr>
<td>PBD</td>
<td>Place Bearing Distance</td>
</tr>
<tr>
<td>PDC</td>
<td>Pre-Departure Clearance</td>
</tr>
<tr>
<td>REG</td>
<td>Registration</td>
</tr>
<tr>
<td>SATCOM</td>
<td>Satellite Communication</td>
</tr>
<tr>
<td>SDB</td>
<td>Subscriber Database</td>
</tr>
<tr>
<td>SID</td>
<td>Standard Instrument Departure</td>
</tr>
<tr>
<td>STAR</td>
<td>Standard Terminal Arrival Route</td>
</tr>
<tr>
<td>STBY</td>
<td>Standby indicator</td>
</tr>
<tr>
<td>TDLS</td>
<td>Tower Data Link System</td>
</tr>
<tr>
<td>TFM</td>
<td>Traffic Flow Management</td>
</tr>
<tr>
<td>TMU</td>
<td>Traffic Management Unit</td>
</tr>
<tr>
<td>TOC</td>
<td>Transfer of Communication</td>
</tr>
<tr>
<td>TRACON</td>
<td>Terminal Radar Approach Control</td>
</tr>
<tr>
<td>UM</td>
<td>Uplink Message</td>
</tr>
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<td>VDL</td>
<td>VHF Data Link</td>
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<td>VFR</td>
<td>Visual Flight Rules</td>
</tr>
<tr>
<td>VHF</td>
<td>Very High Frequency</td>
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<tr>
<td>XML</td>
<td>Extensible Markup Language</td>
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