International Civil Aviation Organization

WORKING PAPER

A41-WP/519
TE/188
12/9/22
(Information paper)
English only

ASSEMBLY — 41ST SESSION

TECHNICAL COMMISSION

Agenda Item 33: Other issues to be considered by the Technical Commission

DATA LINK CAPABILITIES AND INTRODUCTION OF CPDLC/DCL SERVICES

(Presented by Saudi Arabia)

EXECUTIVE SUMMARY
This paper provides an overview on air traffic services (ATS) data link capabilities deployed by the air navigation service provider in the Kingdom of Saudi Arabia (Saudi Air Navigation Services (SANS)). It highlights the main functions and features of the new ATM system, VHF ground stations supporting VHF data link and aircraft communications addressing and reporting system (ACARS) services. It also highlights the partnership agreement with leading datalink service provider (SITAONAIR) and provides information on the introduction of controller pilot data link communications (CPDLC) service within Jeddah flight information region (FIR) and departure clearance (DCL) at Madinah (OEMA), Jeddah (OEJN), Riyadh (OERK), Dammam (OEDF), Abha (OEAB), and Gassim (OEGS) Aerodrome Control Towers through automated assistance for requesting and delivering clearances, with the objective of reducing pilot and Controller workload.

Strategic Objectives:	This paper relates to the Safety and Air Navigation Capacity and Efficiency Strategic Objectives.
Financial implications:	Without any financial implications
References:	Annex 10 — *Aeronautical Telecommunications*, Volume II — *Communication Procedures including those with PANS status* and Volume III — *Communication Systems,* Part 1 Chapter 3 Annex 11 — *Air Traffic Services* Doc 4444, *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM) Doc 10037, *Global Operational Data Link (GOLD) Manual*

1.   **INTRODUCTION**

1.1   The controller pilot data link communications (CPDLC) is defined as means of communication between air traffic controller and pilots, using data link for air traffic control (ATC) communications. CPDLC allows direct exchange of standardized (pre-formatted) messages between a controller and a pilot, as an alternative to voice communications. In addition, it supports automation by using and processing the exchanged data by onboard and ground systems with error detection and reporting capabilities.

1.2   The CPDLC messages are displayed at air traffic controller working positions (CWPs) and on the flight deck visual display, using specific interfaces and communication subnetworks. The ATM system based CPDLC application provides air-ground data communication for the ATC service. It enables a number of data link services (DLS) to exchange communication and clearance/information/request messages, which correspond to voice phraseology employed during the provision of air traffic control services.

1.3   The CPDLC requirements are covered under several ICAO provisions which mainly include Annex 10, Volume II and Volume III Part 1 Chapter 3, and Annex 11. The CPDLC operational requirements are detailed under ICAO Doc 4444: PANS-ATM and message set are described in Appendix 5 of Doc 4444. *Manual of Air Traffic Services Data Link Application* (Doc 9694), and the *Global Operational Data Link (GOLD) Manual* (Doc 10037) are the main guidance material on ATS data link services, including data link initiation capability (DLIC), and CPDLC.

2.   **OVERVIEW ON DATA LINK CAPABILITIES IN SAUDI ARABIA**

2.1   The air navigation service provider in the kingdom of Saudi Arabia (Saudi Air Navigation Services (SANS)) has deployed a state-of-the-art modular, advanced, and integrated surveillance, flight data processing and display system based ATM system for the provision of ACC/APP/TWR air traffic control services from Riyadh and Jeddah Area Control Centers (ACCs), Dammam and Abha Approach Control Centers (APP) and thirteen local and remote TWRs. The ATM system comprises also of Training/Simulation/Test facilities and was designed to meet the requirements of ICAO aviation system block upgrades (ASBU) framework defined under Global Air Navigation Plan (GANP), and to further enable easy expansion in order to meet any future upgrading of ICAO ASBU blocks, current, and future ATM needs within Jeddah FIR under various traffic loads, multiple internal terminal areas, and interfacing with local and neighboring ATS facilities. This system is also composed of several sub-systems supporting specific functions, which include Air-Ground Data Link applications (ADS-C, CPDLC, Departure Clearance (DCL)) and services for aircraft-controller interoperability. The system is currently compliant with the following data link ASBU elements: COMS-B0/1 (CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace, COMS-B0/2 (ADS-C (FANS 1/A) for procedural airspace), COMS-B1/1 (PBCS approved CPDLC (FANS 1/A+) for domestic and procedural airspace), COMS-B1/2 (PBCS approved ADS-C (FANS 1/A+) for procedural airspace).

2.2   The air-ground data link processing (AGDLP) redundant server-based function is in charge of data link applications (ADS-C, CPDLC, DCL) between aircraft and controllers and ensures the data communication with the air-ground networks infrastructure supplied by SITAONAIR as datalink service provider (DSP). The AGDLP is providing the following features:

        a)   **ATS Facilities Notification/Contract Management (AFN/CM) Manager**. It allows addressing capability for data link applications between aircraft and ground;

b) **Controller Pilot Data Link Communication (CPDLC) Manager**. It allows exchange data messages between Controller and pilot. The CPDLC application provides the capability to establish, manage and terminate dialogues initiated by the pilot or by the Controller;

c) **Departure Clearance (DCL) Manager**. It provides automated assistance for requesting and delivering departure clearances through the data messages exchange between tower personnel and pilot; and

d) **FANS** (*) **Communication Interface**. It contains the ground-end system communications interface for the ACARS network (FANS equipped aircraft).

2.3   The AGDLP interfaces with the aircraft communications addressing and reporting system (ACARS) network of Data Link Services managed by SITAONAIR for exchanging ADS-C, CPDLC and DCL with aircraft. The interface with ACARS is supporting the data type that is compliant with the following standards: FANS 1/A AFN, CPDLC and ADS-C messages according to FANS 1/A RTCA DO-258A/EUROCAE ED-100A and DCL messages according to FANS 1/A EUROCAE ED-85A.

2.4   To support the deployment of datalink services within Jeddah FIR, the air navigation service provider in the kingdom of Saudi Arabia (SANS) signed partnership agreement with SITAONAIR where SANS make available its VHF Data link Mode 2 (VDL Mode2) infrastructure: equipment (VHF Ground Stations (VGS), ground network, supporting systems (routing and monitoring) deployed with the existing VHF communications infrastructure (Remote Communication Air/Ground (RCAG), Remote Transmitter/Receivers (RTR). This infrastructure is used by SITAONAIR for the provision of VHF Data Link Mode 2 (VDL Mode 2) service to airlines and aircraft operators that are customers of SITAONAIR AIRCOM (**) services. The current available coverage of VGS within Jeddah FIR is illustrated in Appendix to this paper.

3.   **INTRODUCTION OF CPDLC AND DCL SERVICE WITHIN JEDDAH FIR**

3.1   Under the enhancement of the ATS applications, the air navigation service provider in the kingdom of Saudi Arabia (SANS) initiated an implementation program to introduce CPDLC service within Jeddah FIR and departure clearance (DCL) at Madinah (OEMA), Jeddah (OEJN), Riyadh (OERK), Dammam (OEDF), Abha (OEAB), and Gassim (OEGS) Towers through automated assistance for requesting and delivering clearances, with the objective of reducing pilot and Controller workload and clearance delivery delays. The new services were subject of formal consultation and coordination with the main airspace users to gather their views and feed-back on the overall data link services within Jeddah FIR and their expectations on the introduction of CPDLC and DCL services.

3.2   The CPDLC and DCL services will be provided as an alternative means of communication for non-urgent or time-critical voice communications. The ATC VHF voice communications are immediately available for intervention to address non-routine and time-critical

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(*) *FANS means communications using future air navigation system applications including Air Traffic Services Facilities Notification (AFN), Controller-Pilot Datalink Communications (CPDLC), and Automatic Dependent Surveillance-Contract (ADS C) over ACARS.*
(**) *AIRCOM means the service provided by SITAONAIR on a global basis to support the exchanges of messages using Aircraft Communications Addressing and Reporting System (ACARS) protocols between aircraft and ground-based systems, regardless of whether such messages support Airlines Operational Communications (AOC) or ATC applications, and regardless of whether such messages have been using Plain Old ACARS VHS stations, VDL Mode 2 stations or satellite services.*

situations. Time-criticality is mainly determined by the following factors: ATC traffic situation, end-to-end performance (systems and flight crew/controller response time) and recovery time. The airspace users should be aware that while a voice communication/response is generally expected in seconds there is latency of CPDLC that depends on the end-to-end system. The CPDLC and DCL messages and applications are implemented in accordance with General Authority of Civil Aviation requirements, ICAO Annex 10, Vol. II, III, and Annex 11 provisions and PANS-ATM procedures published under ICAO Doc 4444. The Global Operational Data Link (GOLD) Manual (Doc 10037) is the primary guidance material that was considered in the development of ATS data link operational requirements.

3.3   CPDLC services are available from FL 150 and above within Jeddah FIR to all equipped aircraft with ATN VDL Mode 2, FANS1/A, FANS1/A+, and ATN B1. The following CPDLC services are provided:

   a)   data link initiation capability;

   b)   ATC clearances and instructions; and

   c)   ATC communications management.

3.4   The Departure Clearance (DCL) function is integrated in the System performed by the Air-Ground Data Link Processing (AGDLP) and the FDP functions as explained under §2 of this paper. The DCL function is implemented in accordance with the standards: ED-85A specifications and DCL dialogue is carried out using the Tower Electronic Flight Strips. The Air Traffic Controller can check the status of the DCL dialogue by means of a color background in the corresponding field of the Tower Electronic Flight Strips and DCL dialogue setting (manual or automatic mode) can be managed from the ATC TWR Supervisor's position. The DCL message types and contents exchanged between aircraft and ATC TWR, are set in accordance with the standard ED-85A, and comprise the following:

   a)   departure clearance request (RCD), Downlink – RCD;

   b)   departure clearance uplink (CLD), Uplink – CLD;

   c)   departure clearance readback (CDA), Downlink – CDA; and

   d)   flight system message (FSM), Uplink – FSM.

3.5   For the introduction of CPDLC and DCL services, the air navigation service provider in the kingdom of Saudi Arabia (SANS) developed safety risk assessment (SRA) for each application, operational procedures, and transition plan covering:

   a)   coordination with airspace users to share information on the introduction of CPDLC and DCL and ways and means to report issues and concerns on services;

   b)   final checks on operational and technical readiness for the introduction of CPDLC and DCL services;

   c)   amendment to KSA AIP to provide details on the new services;

initial operational trial period of 180 days starting in 24 August 2022 to assess CPDLC data link performance in Jeddah FIR. A copy of the aeronautical information circular is provided in the Appendix of this paper; and

d) post-operational trials assessment through detailed analysis of delivery performance on the following areas of interest: uplink performance, downlink performance, message reject rate, and system availability. Based on this assessment a detailed description of the service will be provided in the kingdom of Saudi Arabia AIP.

3.6   The results and outcome of the assessment and analysis of CPDLC and DCL data link performance will be shared through ICAO MID CNS SG during the upcoming meetings.

4.   **CONCLUSION**

4.1   The implementation of CPDLC and DCL services within Jeddah FIR is intended as supplementary means of voice communication and will be used in the context of non-time and safety critical communications. The procedures related to CPDLC and DCL operations, flight planning, transfer between data authority, type of messages and their composition, phraseology, and switch to voice communications will be described under KSA AIP GEN 1.5 and AD 2.20 section for each aerodrome where DCL is introduced.

4.2   The use of CPDLC and DCL is not mandatory in the Kingdom of Saudi Arabia and will be conducted at the discretion of ATC and the pilots concerned. To use the CPDLC and/or DCL services, pilots shall file the respective aircraft equipage in their flight plan (FPL 2012 format), field item 10 with the appropriate J codes and field 18, as defined under ICAO Doc 4444, Appendix 2.

4.3   Where urgent or time critical communications are required, voice communications must be used. Voice read back is not required for any CPDLC and DCL instructions. In cases where uncertainty arises as a result of a data link message, communication shall revert to voice.

4.4   The Assembly is invited to take note of the information provided in this paper and encourage States and Regions to exchange information on the implementation and introduction of data link services (DLS) supporting ATS communications.

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APPENDIX

CURRENT VGS COVERAGE USED FOR DATA LINK SERVICES WITHIN JEDDAH FIR

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CPDLC trials

OPERATIONAL TRIALS FOR INTRODUCTION OF CPDLC SERVICE JEDDAH FIR

1. Purpose

1.1   The purpose of this Circular is to provide information on the operational trials of Controller Pilot Data Link Communication (CPDLC) that will conducted in JEDDAH FIR from 24th August 2022 until 24th February 2023

1.2   The aircraft operators and pilots are requested to report any observed or identified issues in CPDLC service (e.g., latency, wrong sequence, inappropriate reply message, wrong or incorrect message) using the contact details provided in paragraph 6 of this Circular

2. CPDLC supporting Infrastructure and arrangements.

2.1   Under the enhancement of ATS applications, Saudi Air Navigation Services (SANS) initiated an implementation program to introduce CPDLC service within Jeddah FIR through automated assistance for requesting and delivering clearances, with the objective of reducing pilot and Controller workload. The new service was subject of formal consultation and coordination with the main airspace users to gather their views and expectations on the introduction of CPDLC service.

2.2   To support the deployment of Datalink services within Jeddah FIR, SANS signed partnership agreement with SITAONAIR where SANS make available its VHF data link Mode2 (VDL Mode2) Infrastructure: equipment (VHF Ground Stations (VGS), ground network, supporting systems (rouing and monitoring) to be used by SITAONAIR for the provision of VHF data link Mode2 (VLD Mode2) service to airlines and aircraft operators that are customers of SITAONAIR AIRCOM (**) service.

2.3   The VHF ground stations (VGS) include both VDL and Plain Old ACARS (POA) radios and are deployed using existing VHF communications infrastructure (Remote Communication Air/Ground (RCAG) used for en-route COM services), and Remote Transmitter/Receivers (RTR) used for APP service. The current available coverage of VGS is illustrated in Attachment to this circular.

3. Description of CPDLC service.

3.1   The CPDLC provides means of communication between the controller and pilot, using data link for ATC communication. The CPDLC service is associated with radar/surveillance system and availability of service and includes a set of clearance/information/request message elements which corresponds to the phraseologies used in the radiotelephony environment. Standard voice radiotelephony will remain the primary means of ATC communications at all times. Any failure event concerning CPDLC will lead to a reversion to voice operation and the CPDLC service will be suspended during radar/surveillance system failure

3.2   The CPDLC service will be provided as an alternative means of communication for non-urgent or time-critical voice communications. The ATC VHF voice communications are immediately available for intervention to address non-routine and time-critical situations. Time-criticality is mainly determined by the following factors: ATC traffic situation, end-to-end performance (systems and flight crew/controller response time) and recovery time. The airspace users should be aware that while a voice communication/response is generally expected in seconds there is latency of CPDLC that depends on the end-to-end system

3.3   The CPDLC messages and application are implemented in accordance with GACA requirements, ICAO Annex 10, Vol. II, III, and Annex 11 provisions and PANS-ATM procedures published under ICAO Doc 4444. The Global Operational Data Link (GOLD) Manual (Doc 10037) is the primary guidance material that was considered in the development of CPDLC data link operational requirements.

3.4   CPDLC service is available from FL150 and above within Jeddah FIR to all equipped aircraft with FANS1/A and FANS1/A+ and will be used under the conditions described in §3 of this AIC. The following CPDLC services are provided:

• Data link initiation capability;
• ATC clearances and instructions
• ATC communications management

3.5   The use of CPDLC is not mandatory in KSA and will be provided at the discretion of ATC and the pilots. In order to use the CPDLC service, pilots shall file the respective aircraft equipage in their flight plan (FPL 2012 format), field item 10 with the appropriate J codes and field 18, as defined under ICAO Doc 4444, Appendix 2.

3.6   Where urgent or time critical communications are required, voice communications must be used. Voice read back is not required for any CPDLC instructions. In cases where uncertainty arises as a result of a data link message, communication shall revert to voice R/T.

4. LOGON to CPDLC service

4.1   The logon is the first step in the data link process and is initiated either by the flight crew, or automatically following data link transfer between Jeddah and Riyadh ACC. Once the logon is complete, Jeddah or Riyadh ACC will request a CPDLC connection, which should be automatically accepted by the aircraft.

4.2   The LOGON addresses to be used for CPDLC service within Jeddah FIR are the following:

• Logon address for CPDLC service provided by Jeddah ACC is JEDAAYA
• Logon address for CPDLC service provided by Riyadh ACC is RUHAAYA

4.3   A CPDLC connection immediately becomes active when established if no previous CPDLC connection exists at that time. An active CPDLC connection allows Jeddah or Riyadh ACC and the aircraft to exchange CPDLC messages. Jeddah or Riyadh ACC with which an aircraft has an active CPDLC connection is referred to as the Current Data Authority (CDA).

4.4   An inactive connection Next Data Authority (NDA) can be established upon completion of the logon procedure if a previous CPDLC connection exists with the aircraft.

4.5   Under the provision of CPDLC service, Jeddah or Riyadh ACC with the CDA connection will manage its CPDLC connections, including transferring and terminating the connection when no longer needed. CPDLC transfers will be initiated before the aircraft transits from the current ATS Unit (Jeddah or Riyadh ACC) to another one and will terminate the connection as the aircraft leaves the Area of Responsibility of each area control centre. These transfers are automatic and should be seamless to the crew without any action required

4.6   Should a datalink transfer fail to complete, the transferring ATS Unit (Jeddah or Riyadh ACC) will be alerted, which may result in a request to the crew to disconnect CPDLC and to either perform a re-logon to reinitiate the transferring process, or to logon to the next ATS Unit.

5. Operational trials

5.1   The operational trials of Controller Pilot Data Link Communication (CPDLC) in Jeddah FIR will start on 24th August 2022 until 24th February 2023. This period may be extended based the analysis of service performance. A comprehensive post operational trials review is planned to resolve identified issues and introduce improvements where required. Once the readiness of CPDLC service is confirmed, the procedures related to CPDLC operations, flight planning, transfer between data authority, type of messages and their composition, phraseology, and switch to voice communications will be described under KSA AIP GEN 1.5.

6. CPDLC Messages

6.1   The following uplink/downlink messages are processed by the ATM system used at Jeddah and Riyadh ACCs:

Uplink Messages	
Message	**Description**
UM0	UNABLE, Indicates that ATC cannot comply with the request
UM1	STANDBY, Indicates that ATC has received the message and will respond. Note.— The flight crew is informed that the request is being assessed and there will be a short-term delay (e.g. as appropriate, given the situation, but not to exceed 10 minutes). The exchange is not closed and the request will be responded to when conditions allow.
UM3	ROGER, indicates that ATC has received and understood the message
UM4	AFFIRM Indication that ATC is responding positively to the message
UM5	NEGATIVE Indication that ATC is responding negatively to the message
UM19	MAINTAIN [level] Instruction to maintain the specified level.
UM20	CLIMB TO AND MAINTAIN [level] Instruction to climb and maintain a specific level
UM23	DESCEND TO AND MAINTAIN [level] Instruction to descend and maintain the specific level
UM106	MAINTAIN [speed] KN Instruction increase or decrease speed to the specified number.
UM94	TURN [Direction] [heading] DEGREES Instruction to turn to the specified heading
UM74	PROCEED DIRECT TO [point or NAVAID] Instruction to fly direct to a specific point
UM161	END SERVICE , Notification to the avionics that the data link connection with the current data authority is being terminated
UM117	CONTACT [unit name frequency] HF CONTACT [unit name frequency] VHF CONTACT [unit name frequency] UHF
UM160	NEXT DATA AUTHORITY [facility designation], Notification to the avionics that the specified data authority is the next data authority. If no data authority is specified, this indicates that any previously specified next data authority is no longer valid.
UM7	EXPECT CLIMB AT (time) Notification that an instruction may be expected for the aircraft to commence climb at the specified time
UM8	EXPECT CLIMB AT (position) Notification that an instruction may be expected for the aircraft to commence climb at the specified position.
UM30	MAINTAIN BLOCK (altitude) TO (altitude) Note.— Used for a vertical range
UM36	EXPEDITE CLIMB TO (altitude) Note.— This message element is equivalent to SUPU-3 plus LVLU-6 in Doc 4444
UM38	IMMEDIATELY CLIMB TO (altitude)
UM21	AT (time) CLIMB TO AND MAINTAIN (altitude) Note.— A vertical range can not be provided
UM22	AT (position) CLIMB TO AND MAINTAIN (altitude) Note.— A vertical range can not be provided
UM24	AT (time) DESCEND TO AND MAINTAIN (altitude). Instruction that at the specified time a descent to the specified level or vertical range is to commence and once reached is to be maintained
UM25	AT (position) DESCEND TO AND MAINTAIN (altitude) Instruction that at the specified position a descent to the specified level or vertical range is to commence and once reached is to be maintained
UM26	CLIMB TO REACH (level) BY (time) Instruction that a climb is to be completed such that the specified level is reached before the specified time
UM27	CLIMB TO REACH (level) BY (position) Instruction that a climb is to be completed such that the specified level is reached before passing the specified position
UM28	DESCEND TO REACH (altitude) BY (time)

Uplink Messages	
Message	**Description**
UM31	CLIMB TO AND MAINTAIN BLOCK (altitude) TO (altitude) Note.— Used for a vertical range
UM32	DESCEND TO AND MAINTAIN BLOCK *(altitude)* TO *(altitude)*. Instruction that a descent to the specified level or vertical range is to commence and once reached is to be maintained
UM171	CLIMB AT (vertical rate) MINIMUM
UM172	CLIMB AT (vertical rate) MAXIMUM
UM9	EXPECT DESCENT AT (time) EXPECT LOWER AT (position) Notification that an instruction may be expected for the aircraft to commence descent at the specified time
UM10	EXPECT DESCENT AT (position) Notification that an instruction may be expected for the aircraft to commence descent at the specified position
UM37	EXPEDITE DESCENT TO, *(altitude)* Instruction that a descent to the specified level or vertical range is to commence and once reached is to be maintained
UM29	DESCEND TO REACH (altitude) BY (position)
UM39	IMMEDIATELY DESCEND TO (altitude)
UM173	DESCEND AT (vertical rate) MINIMUM Instruction to descend at the specified rate or greater
UM174	DESCEND AT (vertical rate) MAXIMUM Instruction to descend at the specified rate or less.
UM46	CROSS (position) AT (altitude
UM47	CROSS (position) AT OR ABOVE (level single), Instruction that the specified position is to be crossed at or above the specified level
UM50	CROSS *(position)* BETWEEN *(altitude)* AND *(altitude)* Instruction that the specified position is to be crossed at the specified level or within the specified vertical range
UM51	CROSS (position) AT (time) Instruction that the specified position is to be crossed at the specified time
UM52	CROSS (position) BEFORE TIME (time) Instruction that the specified position is to be crossed before the specified time
UM48	CROSS (position) AT OR BELOW (level single) Instruction that the specified position is to be crossed at or below the specified level
UM53	CROSS (position) AT OR AFTER (time), Instruction that the specified position is to be crossed at the specified speed
UM54	CROSS *(position)* BETWEEN *(time)* AND *(time)* Instruction that the specified position is to be crossed between the specified times
UM55	CROSS (position) AT (speed) Instruction that the specified position is to be crossed at the specified speed
UM56	CROSS *(position)* AT OR LESS THAN *(speed)* Instruction that the specified position is to be crossed at or less than the specified speed
UM57	CROSS *(position)* AT OR GREATER THAN *(speed)* Instruction that the specified position is to be crossed at or greater than the specified speed
UM58	CROSS *(position)* AT *(time)* AT *(altitude* Instruction that the specified position is to be crossed at the specified time and at the level or within the vertical range as specified. *Note.— A vertical range cannot be provided*
UM59	CROSS *(position)* AT OR BEFORE *(time)* AT *(altitude)* Instruction that the specified position is to be crossed before the specified time and at the level or within the vertical range as specified. *Note.— A vertical range cannot be provided.*
UM60	CROSS *(position)* AT OR AFTER *(time)* AT *(altitude)* Instruction that the specified position is to be crossed after the specified time and at the level or within the vertical range as specified. *Note.— A vertical range cannot be provided*
UM61	CROSS *(position)* AT AND MAINTAIN *(altitude)* AT *(speed)* Instruction that the specified position is to be crossed at the level or within the vertical range, as specified, and at the specified speed. *Note 1.— A vertical range cannot be provided.*

Uplink Messages	
Message	**Description**
UM63	AT *(time)* CROSS *(position)* AT AND MAINTAIN *(altitude)* AT *(speed)* Instruction that the specified position is to be crossed at the specified time at the level or within the vertical range, as specified, and at the specified speed. *Note 1.— A vertical range cannot be provided.*
UM64	OFFSET (distance offset) (direction) OF ROUTE, Instruction to fly a parallel track to the cleared route at a displacement of the specified distance in the specified direction.
UM65	AT *(position)* OFFSET *(distance offset)* *(direction)* OF ROUTE. Instruction to fly a parallel track to the cleared route at a displacement of the specified distance in the specified direction and commencing at the specified position
UM66	AT (time) OFFSET (distance offset) (direction) OF ROUTE, Instruction to fly a parallel track to the cleared route at a displacement of the specified distance in the specified direction and commencing at the specified time
UM67	PROCEED BACK ON ROUTE,_Instruction to rejoin the cleared route
UM68	REJOIN ROUTE BEFORE PASSING (position), Instruction to rejoin the cleared route before passing the specified position
UM69	REJOIN ROUTE BY *(time),* Instruction to rejoin the cleared route before the specified time
UM70	EXPECT BACK ON ROUTE BEFORE PASSING (position), Notification that a clearance may be issued to enable the aircraft to rejoin the cleared route before passing the specified position.
UM71	EXPECT BACK ON ROUTE BEFORE TIME (time), Notification that a clearance may be issued to enable the aircraft to rejoin the cleared route before the specified time
UM72	RESUME OWN NAVIGATION Instruction to resume own navigation following a period of tracking or heading clearances. May be used in conjunction with an instruction on how or where to rejoin the cleared route
UM82	CLEARED TO DEVIATE UP TO (lateral deviation) OF ROUTE, Instruction allowing deviation up to the specified distance(s) from the cleared route in the specified direction(s)
UM78	AT (level single) PROCEED DIRECT TO (position), Instruction to proceed upon reaching the specified level,directly to the specified position
UM79	CLEARED TO (position) VIA (departure data[O]) (en-route data), Instruction to proceed to the specified position via the specified route
UM80	CLEARED (departure data[O]) (en-route data) (arrival approach data) Instruction to proceed via the specified route
UM81	CLEARED (procedure name) Instruction to proceed in accordance with the specified procedure
UM83	AT (position) CLEARED (route clearance) Instruction to proceed from the specified position via the specified route.
UM84	AT (position) CLEARED (procedure name), Instruction to proceed from the specified position via the specified procedure
UM91	HOLD AT (position) MAINTAIN (altitude) INBOUND TRACK (degrees) (direction) TURN LEG TIME (leg type), Instruction to enter a holding pattern at the specified position in accordance with the specified instructions
UM92	HOLD AT (position) AS PUBLISHED MAINTAIN (altitude), Instruction to enter a holding pattern at the specified position in accordance with the published holding instructions
UM93	EXPECT FURTHER CLEARANCE AT (time), Notification that an onwards clearance may be issued at the specified time
UM75	WHEN ABLE PROCEED DIRECT TO (position)
UM76	AT (time) PROCEED DIRECT TO (position) Instruction to proceed, at the specified time, directly to the specified position.
UM77	AT (position) PROCEED DIRECT TO (position) Instruction to proceed, at the specified position directly to the next specified position
UM95	TURN (direction) GROUND TRACK (degrees) Instruction to turn left or right as specified on to the specified track
UM215	TURN (direction) (degrees) Instruction to turn the specified number of degrees left or right
UM96	FLY PRESENT HEADING, Instruction to continue to fly the present heading

Uplink Messages	
Message	**Description**
UM97	AT (position) FLY HEADING (degrees) Instruction to fly the specified heading upon reaching the specified position.
UM98	MMEDIATELY TURN (direction) HEADING (degrees), Instruction to turn left or right as specified on to the specified heading
UM99	EXPECT *(named instruction)* Notification that a clearance may be issued for the aircraft to fly the specified procedure or clearance name. *Note.— Used when a published procedure is designated*
UM100	AT (time) EXPECT (speed) Notification that a speed instruction may be issued to take effect at the specified time
UM101	AT (position) EXPECT (speed) Notification that a speed instruction may be issued to take effect at the specified position
UM102	AT (altitude) EXPECT (speed) Notification that a speed instruction may be issued to take effect at the specifiedlevel
UM107	MAINTAIN PRESENT SPEED Instruction to maintain the present speed
UM108	MAINTAIN (speed) OR GREATER, Instruction to maintain the specified speed or greater
UM109	MAINTAIN (speed) OR LESS Instruction to maintain the specified speed or less.
UM110	MAINTAIN (speed) TO (speed) Instruction to maintain the specified speed range
UM111	INCREASE SPEED TO (speed), Instruction that the present speed is to be increased to the specified speed and maintained until further advised
UM112	INCREASE SPEED TO (speed) OR GREATER, Instruction that the present speed is to be increased to the specified speed or greater and maintained at or above the specified speed until further advised
UM113	REDUCE SPEED TO (speed) Instruction that the present speed is to be reduced to The specified speed and maintained until further advised
UM114	REDUCE SPEED TO (speed) OR LESS Instruction that the present speed is to be reduced to the specified speed or less and maintained at or below the specified speed until further advised
UM116	RESUME NORMAL SPEED, Instruction to resume a normal speed. The aircraft no longer needs to comply with a previously issued speed restriction
UM134	CONFIRM SPEED
UM136	CONFIRM ASSIGNED SPEED Request to confirm the assigned speed.
UM118	AT (position) CONTACT (ICAO unit name) (frequency) Instruction at the specified position to establish voice. contact with the specified ATS unit on the specified frequency
UM119	AT (time) CONTACT (ICAO unit name) (frequency), Instruction at the specified time to establish voice contact with the specified ATS unit on the specified frequency
UM120	MONITOR (ICAO unit name) (frequency) Instruction to monitor the specified ATS unit on the specified frequecy. The flight crew is not required to establish voice contact on the frequency
UM121	AT (position) MONITOR (ICAO unit name) (frequency) Instruction at the specified position to monitor the specified ATS unit on the specified frequency. The flight crew is not required to establish voice contact on the frequency
UM122	AT (time) MONITOR (ICAO unit name) (frequency) Instruction at the specified time to monitor the specified ATS unit on the specified frequency. The flight crew is not required to establish voice contact on the frequency
UM124	STOP SQUAWK Instruction to disable SSR transponder responses
UM125	SQUAWK MODE C W/U SQUAWK ALTITUDE Instruction to include level information in the SSR transponder responses
UM126	STOP ALTITUDE SQUAWK Instruction to stop including level information in the SSR transponder responses
UM127	REPORT BACK ON ROUTE Instruction to report when the aircraft is back on the cleared route. *Note.— R response attribute*
UM144	CONFIRM SQUAWK CODE Request to confirm the selected SSR code
UM179	SQUAWK IDENT Instruction that the 'ident' function on the SSR transponder is to be actuated

Uplink Messages	
Message	**Description**
UM123	SQUAWK (SSR code) Instruction to select the specified SSR code.
UM128	REPORT LEAVING (altitude) Instruction to report upon leaving the specified level. Note.— R response attribute.
UM180	REACHING BLOCK (altitude) Instruction to report upon reaching the specified vertical range. Note.— R response attribute
UM135	CONFIRM ASSIGNED ALTITUDE, Request to confirm the assigned level. Note.— NE response attribute
UM169	ADVISE TOP OF DESCENT Request to provide the preferred time and/or position to commence descent to the aerodrome of intended arrival. Note.— R response attribute
UM170	REVISED *(revision reason[O])* Indication that the associated instruction is either a revision to a previouly issued instruction or is different from the requested clearance *Note.— R response attribute*.
UM130	REPORT PASSING (position) Instruction to report upon passing the specified position
UM131	REPORT REMAINING FUEL AND SOULS ON BOARD Request to provide the fuel remaining (time) and the number of persons on board.Y *Note.— NE response attribute*
UM129	REPORT LEVEL (altitude) Instruction to report upon maintaining the specified level
UM143	CONFIRM REQUEST, Request to confirm the referenced request since the initial request was not understood. The request should be clarified and resubmitted
UM147	REQUEST POSITION REPORT Request to make a position report.
UM137	CONFIRM ASSIGNED ROUTE Request to confirm the assigned route. Note.— NE response attribute
UM148	WHEN CAN YOU ACCEPT Request for the earliest time or position when the specified level can be accepted. Note.— NE response attribute
UM149	CAN YOU ACCEPT (level single) AT (position) Request to indicate whether or not the specified level can be accepted at the specified position
UM150	CAN YOU ACCEPT (level single) AT TIME (time) Request to indicate whether or not the specified level can be accepted at the specified time
UM151	WHEN CAN YOU ACCEPT (speed), Request for the earliest time or position when the specified speed can be accepted. Note.— NE response attribute
UM153	ALTIMETER (altimeter) Advisory providing the specified altimeter setting for the specified facility (facility deignation). Note.- The facility designation and the time of measurement cannot be provided
UM154	RADAR SERVICES TERMINATED Advisory that the ATS surveillance service is terminated
UM155	RADAR CONTACT (position) Advisory that ATS surveillance service has been established. A position may be specified position. Note. — The provision of the position is required.
UM156	RADAR CONTACT LOST Advisory that ATS surveillance contact has been lost.
UM157	CHECK STUCK MICROPHONE (frequency), Instruction to check the microphone due to detection of a continuous transmission on the specified frequency. Note.— R response attribute
UM158	ATIS *(ATIS code)* ATS advisory that the current ATIS *code* is as specified. *Note.— The airport is not provided*
UM159	ERROR (error information) System-generated notification of an error
UM164	WHEN READY Indication that the associated instruction is to be executed when the flight crew is ready
UM166	DUE TO TRAFFIC Indication that the associated message is issued due to the specified reason.
UM167	DUE TO AIRSPACE RESTRICTION Indication that the associated message is issued due to the specified reason

Message	Downlink Messages
DM0	WILCO, the instruction is understood and will be complied with
DM1	UNABLE, the instruction cannot be complied with

Message	Downlink Messages
DM2	STANDBY , Wait for a reply. Note. The controller is informed that the request is being assessed and there will be a short-term delay (within 10 minutes). The exchange is not closed, and the request will be *responded to when conditions allow*
DM4	*AFFIRM, Yes. Note. AFFIRM is an appropriate response to an uplinked negotiation request message (e.g. UM150 CAN YOU ACCEPT [level] at [time]).*
DM5	NEGATIVE, NO *Note. NEGATIVE is an appropriate response to an uplinked negotiation request message (e.g. UM 150 CAN YOU ACCEPT [level] at [time]).*
DM3	ROGER, Message received and understood. *Note. ROGER is the only correct response to an uplink free text message. Under no circumstances will ROGER be used instead of AFFIRM*
DM6	REQUEST [level] – Request to fly at the specified level Request to fly at thespecified level or vertical range
DM9	REQUEST CLIMB TO [level] - Request to climb to the specified level
DM10	REQUEST DESCENT TO [level] Request to descend to the specified level
DM22	REQUEST DIRECT TO [position] Request to track from the present position direct to the specified position
DM66	DUE TO AIRCRAFT PERFORMANCE, Used to explain reasons for pilot's message.
DM48	POSITION REPORT [position report], Position report. Note. Reports the current position of the aircraft when the flight crew presses the button to send this message. ATC expects position reports based on this downlink message.
DM50	WHEN CAN WE EXPECT *(speed)* TO *(speed)* Use of SPDD-1 REQUEST *(speed)* is recommended
DM55	PAN PAN PAN, Urgency prefix.*FANS 1/A .Ground system will display message to controller for FANS 1/A aircraft*
DM56	MAYDAY MAYDAY MAYDAY, Distress prefix.*FANS 1/A .Ground system will display message to controller for FANS 1/A aircraft*
DM62	ERROR [error information], A system-generated message that the avionics has detected an error
DM112	SQUAWKING 7500, indicates specifically that the aircraft is being subjected to unlawful interference

6.2   Flight crews must be familiar with the proper loading and execution of the above CPDLC uplink messages

7. CPDLC Operational rules

7.1   The following rules should be observed during use of CPDLC service

• Flight crews must ensure that upon receiving an uplink message, the CPDLC address corresponds to the unit name to which the flight is in voice communications

• If a clearance is received that can be automatically loaded into the FMS (e.g. via a LOAD prompt), the flight crew must load the clearance into the FMS and review it before responding with WILCO

• If a CPDLC instruction is superseded by a voice instruction, in order to avoid a time-out the flight crew are requested to respond 'UNABLE' to close the original CPDLC dialogue and follow the voice

• Controllers may be required to respond to a downlink request with 'UNABLE' to close dialogue.

• IF A FLIGHT CREW HAS ANY DOUBT REGARDING THE CONTENT, VALIDITY OR EXECUTION OF A CPDLC MESSGE THEY MUST REVERT TO VOICE IMMEDIATELY TO CLARIFY THE SITUATION.

• CPDLC shall be established in sufficient time to ensure that the aircraft is communicating with the appropriate ATC unit.

• Only one CPDLC connection can be active at any given time

7.2   Active and inactive CPDLC connections: CPDLC connection established between an aircraft and an ATSU is either active or non-active and the following rules applied

- A connection is active when CPDLC messages can be exchanged and non-active when CPDLC messages cannot be exchanged

- Only one CPDLC connection can be active at any given time. A non-active connection becomes active as soon as the active connection is terminated.

- An ATS unit should not assume that its CPDLC connection is active unless receipt of any downlink message from the aircraft, either unsolicited or as a response to an uplink message sent for that purpose.

- CPDLC shall be established in sufficient time to ensure that the aircraft is communicating with the appropriate ATC unit.

- When a request for CPDLC is rejected by an aircraft, the reason for the rejection shall be provided using CPDLC downlink message element NOT CURRENT DATA AUTHORITY or message element NOT AUTHORIZED NEXT DATA AUTHORITY, as appropriate

- Whenever a correction to a message sent via CPDLC is deemed necessary or the contents of a message need to be clarified, the controller or pilot shall use the most appropriate means available for issuing the correct details or for providing clarification

- When a controller or pilot communicates via CPDLC, the response should be via CPDLC. When a controller or pilot communicates via voice, the response should be via voice

- When voice communications are used to correct a CPDLC message for which no operational response has yet been received, the controller's or pilot's transmission shall be prefaced by the phrase: "DISREGARD CPDLC (message type) MESSAGE, BREAK" — followed by the correct clearance, instruction, information or request.

- If the clearance contained in a downlink request is not available, the controller should uplink an UNABLE to deny the request prior to issuing any subsequent clearances.

- CPDLC should not be used to issue immediate or expeditious clearances unless voice communication is not operationally feasible. If an alternative clearance (intermediate level or deferred climb) is available, the controller may subsequently uplink the clearance in a separate CPDLC message. If an alternative clearance that the flight crew might not be able to accept (higher level or route modification) is available, the controller should negotiate the clearance with the flight crew prior to granting it.

- ATCO should never issue a clearance or instruction to an aircraft outside its control area unless otherwise coordinated

8. Contingency Procedures

8.1   The flight crew must advise ATC immediately of any data link issues that might affect FANS (CPDLC) data link operations.

8.2   The use of CPDLC to indicate emergency situations shall only be used if other methods are not possible/ available

9. Contacts for further information

9.1   For further information on the CPDLC operational trials or to provide feedback on the operational trial, please contact the following point of contacts
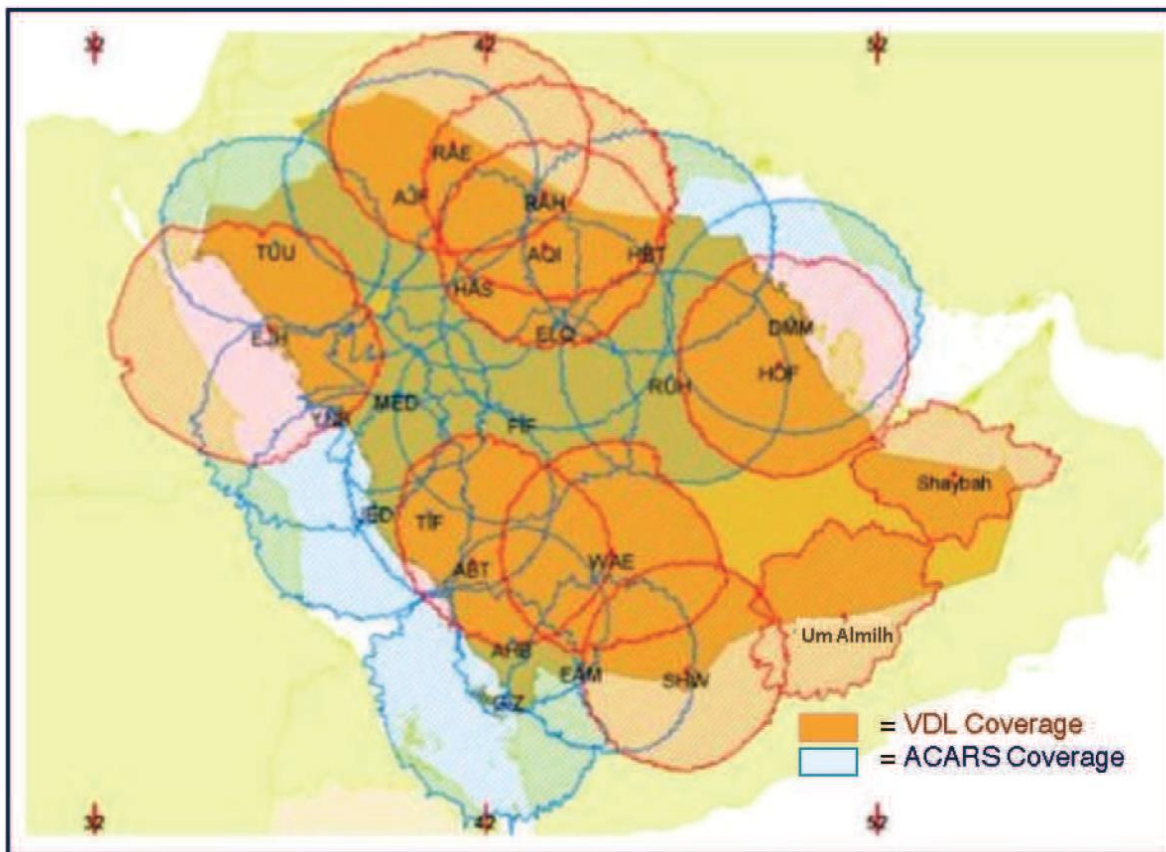
| Jeddah ACC | Email: jccoperation@sans.com.sa
Tel: +966126855006 |
| Riyadh ACC | Email: racc.operations@sans.com.sa
Tel: +966112212008
+966112212009 |

See attachment
Current VGS coverage used for data link services within Jeddah FIR

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— END —