



The European Organisation for Civil Aviation Equipment
L'Organisation Européenne pour l'Équipement de l'Aviation Civile

DATA-LINK APPLICATION SYSTEM DOCUMENT (DLASD) FOR THE "DEPARTURE CLEARANCE" DATA-LINK SERVICE

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FOREWORD

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6. ED-85A improves ED-85 published in June 1998, however both documents remain compatible. The revised document does not add any new requirements as compared with the original, and is published with the sole intention of clarifying any ambiguities in the fields of message formatting, FSM handling and use of message fields. All references to ARINC 623-1 document have been deleted and, instead, all protocol and message definitions are now integrated into APPENDIX A. The revised ED-85A document continues to reference ED-78 in which the features of DLASDs are defined, even though ED-78 itself has now been superseded by ED-78A.
7. Copies of this document may be obtained from:

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CHAPTER 1

GENERAL

1.1 PURPOSE

1.1.1 Data Link Application and System Document (DLASD)

A DLASD (Data Link Application and System Document) is a document which aims at capturing minimum interoperability, performance and safety requirements for ATS services based on data communications.

The writing of such a document is recommended by EUROCAE ED-78 "Guidance material for the establishment of data link supported ATS services" as a means to enable requirements, which accurately define a data link system supporting a data link service, to be collected. The objective is that airborne, communication and ATS ground systems are defined, implemented and operated consistently.

For a given data-link service, a DLASD document aims at:

- Identifying the concept of operations assumed, and the related ATS procedures, based on data communications,
- Providing the functional architecture of the service/application (underscoring the interfaces),
- Specifying the end-to-end requirements at a system level, i.e. interoperability and performance requirements with, when necessary, references to documents produced by international and European standardisation bodies or the industry, such as those produced by the ICAO technical panels, EUROCAE, AEEC or EUROCONTROL,
- Defining the safety objectives applicable to the data link system,
- Describing the sub-systems contribution to the requirements, i.e. the interoperability, performance and safety requirements allocated consistently to each domain (airborne, communication and ATS).
- In addition because:
 - a data-link system is in fact divided into three domains (airborne, communication, and ATS) which work in co-operation but have their own functionalities, environments, technical constraints and levels of security,
 - The approval process of a system is long and expensive.
 - This document aims at avoiding an end-to-end re-certification each time a domain of the chain changes provided that the change does impact neither the global interoperability/performance nor the safety requirements i.e. the DLASD specifications.

Such a document shall be a reference document for manufacturers of the sub-systems, for approval Authorities and for the different service providers involved in the operations of a data-link system.

1.1.2 DLASD for Departure Clearance (DCL)

This document is a DLASD dedicated to the implementation of Departure Clearance over ACARS.

It therefore captures interoperability, performance and safety requirements for the implementation and operations of the ATS service "Departure Clearance" over ACARS. Each organisation involved in the definition, implementation and operations of the "Departure Clearance" ATS data-link service shall comply with the specifications of this document.

1.2 SCOPE

This DLASD deals with the "Departure Clearance" ATS datalink service implementation as per the operational requirements as described in reference [1].

It does not cover those experimental implementations of the "Departure Clearance" ATS datalink service, which are based on free text as well as on different ACARS message formats.

The DCL service is an "Aerodrome Control Service", a direct communication from Aircrew to Controller, as defined in reference [10].

NOTE: *The pre-departure clearance in the US is delivered through the airline dispatch office to the aircrew, more than 30 min. before departure. According to FAA it is an AOC application which has a different operational meaning than the Departure Clearance (DCL) as defined in this document. A comparison between the PDC and DCL services is presented in APPENDIX D.*

This document does not capture any communication requirement which would be applicable to the specific interface between Communication and ATS domain (e.g. X.25), even if that interface characteristics of low level may transcend a domain boundary (Refer to section A.1 in APPENDIX A). However it does identify, for information purposes, any document of relevance for the implementation of such communication interface.

This document is applicable to an operational environment where the communication services can be supported by communication links:

- which are provided by a single communication service provider,
- which rely partially on services proposed by other communication service providers.

1.3 GLOSSARY

Abnormal Mode:

The Abnormal Mode column in the "Detailed description of Normal and Degraded Modes" table (Chapter 4) identifies the possible system failures and operator errors associated to each step of the Normal Mode.

Airborne domain

The airborne domain consists of DCL communication, processing and end-user functions (as defined in ref.[6] para. 2.3.1). Its boundaries have been defined in § 5.3 Figure 5.3.

Airborne system

The airborne system supports the DCL functions and may encompass any airborne internal communication infrastructure. No assumption on the airborne system architecture is made.

Aircraft identification

The Aircraft identification must be in accordance to (Ref. [13]) ICAO document 4444, Appendix 2, item 7 as used in the filed flight plan.

Aircraft Number

The Aircraft Number represents the Aircraft Registration Mark, also called Aircraft Tail Number.

Aircraft Type

The aircraft type and sub type are as specified in the ICAO Aircraft type register, doc 8643.

ATS domain

The ATS domain consists of DCL communication, processing and end-user functions (as defined in ref.[6] para. 2.3.3). Its boundaries have been defined in § 5.3 Figure 5.3.

ATS ground system

The ATS ground system supports the DCL functions and may encompass ATS ground-ground internal communication infrastructure. No assumption on the ATS ground system architecture is made.

Communication domain

The communication domain consists of a set of means to transfer data between the airborne system and the ATS ground system (as defined in ref.[6] para. 2.3.2). Its boundaries have been defined in § 5.3 Figure 5.3.

Communication Ground Station

A ground station provided by the communication service provider to receive and transmit messages to the aircraft (e.g. GES or RGS).

Communication links

The communication links consist of the digital communication equipment, subnetworks and protocols which provide for the transfer of application data from one end system to another (as defined in ref.[6]).

Corrupted message

A corrupted message is one in which the content received by the recipient is not identical to the message sent by the source.

Data Link Service

The notion of "Data-Link Service" has been defined by reference [2] as: "A set of ATM related transactions, both systems supported and manual, which have a clearly defined operational goal".

Data link system

The end-to-end data link system including the communication links, and data link applications (as defined in ref.[6]). It encompasses the three domains as described in § 5.3 Figure 5.3.

Delivered message

A message which is received by the intended recipient.

Domain

It has been defined in reference [6] as: "A bounded system within a specific environment".

End-to-End

The bounds of the end-to-end communication are the aircrew HMI and the controller HMI. For some messages or specific implementations, the end may be an automation system.

End-to-end Delivery Time

The end-to-end delivery time represents the delay between the instant the message is sent by a user or automatically triggered by the end system application and the moment it is available to the peer user or available to the peer end system application.

End user

Either the Aircrew or the Controller.

Failure condition

A failure condition is one that produces an effect on the aircraft and/or its occupants, either direct or consequential through loss of separation, which is caused or contributed to by one or more failures, or errors. Flight phase, relevant adverse operational (density or air traffic, TMA, etc...) conditions, environmental conditions, and external events are to be considered when determining if a failure condition exists.

Inform

"Inform" means to "make information available". Such notification does not require any alerting and the information may be made available to the operator on request only.

IOR_A, IOR_C, IOR_G

The term "IOR" means "Interoperability Operational Requirement". The IOR is an operational specification that shall or may be assumed by the specified user/provider of the DCL service: Aircrew (IOR_A), communication Service Provider (IOR_C) or Controller (IOR_G), in order to ensure interoperability between the three domains.

ITR_A, ITR_C, ITR_G

The term "ITR" means "Interoperability Technical Requirement". The ITR is a technical specification that shall or may be assumed by the specified sub-system: Airborne system (ITR_A) or communication links (ITR_C) or ATS ground system (ITR_G), in order to ensure interoperability between the three domains.

Lost message

A message is considered lost if it is received later than ten times the end-to-end delivery time requirement or not delivered at all.

May

The word "may" denotes an option.

Message

An information content including protocol header and footer exchanged between two entities (end-to-end message, or airborne/communication/ground domain message). It corresponds either to one DCL message (RCD, FSM, CLD, CDA) or a subset of it.

NOTE: *In the communication domain a small message is up to one ARINC 618 block, whereas a large message is any message over one block but less than 5 blocks.*

Nil

The word "Nil" means that no action is assumed by any segment (Airborne, Communication, ATS ground) of the DCL system.

Normal Mode

The Normal Mode column in the "Detailed description of Normal and Degraded Modes" table (Chapter 4) describes how the Service is normally conducted. It describes how the Controller, Aircrew, and/or support system(s) will perform the service with datalink assistance. It also covers procedures and identifies optional features in addition to the mandatory features of the datalink service.

Option

As defined in Chapter 4, the term "Option N° x" defines the optional implementation of a set of messages. Consistency between the different possible options is defined in § 4.2.1.

PTR, PTR_A, PTR_C, PTR_G

The term "PTR" means "Performance Technical Requirement". The PTR is a technical specification that shall or may be assumed by the specified system or sub-system: DCL system (PTR) or Airborne system (PTR_A) or communication links (PTR_C) or ATS ground system (PTR_G), in order to ensure the overall performance of the DCL Service.

Response to Abnormal Mode

The Response to Abnormal Mode column in the "Operating Method" table (Chapter 4) describes what should happen for each of the cases identified in the Abnormal Mode column. This includes error reporting, exception handling, recovery needs, procedures, and alternative information exchange (including reversion to voice communications).

Shall

The word "shall" denotes a mandatory requirement.

If used in an optional step of the Operating Method (Chapter 4), the word "shall" denotes a mandatory requirement in the option, as long as the option is implemented.

Should

The word "should" denotes a preferred requirement.

SOR, SOR_A, SOR_C, SOR_G

The term "SOR" means "Safety Operational Requirement". The SOR is an operational specification that shall or may be assumed by the specified user/provider of the DCL service: any end-user of the DCL service (SOR), Aircrew (SOR_A) or communication service provider (SOR_C) or Controller (SOR_G), in order to guarantee the safety of the DCL service.

STR, STR_A, STR_C, STR_G

The term "STR" means "Safety Technical Requirement". The STR is a technical specification that shall or may be assumed by the specified system or sub-system: DCL system (STR), airborne system (STR_A) or communication links (STR_C) or ATS ground system (STR_G), in order to guarantee the safety of the DCL service.

System unavailability

The system unavailability is defined as the probability that a departure clearance procedure is unsuccessful due to a failure (total loss) of one of the system's elements (airborne, communication, ATS ground). It does not include the loss or lengthy transfer time of particular messages (see chapter 5).

Time accuracy

Time accuracy is defined as the instantaneous difference between UTC time and the time reference used by a system.

t_i

t_i is the earliest time at which a datalink DCL service (RCD sending) can be initiated. It could be defined according to the availability of FDPS data in the ATS ground system.

t_i shall be defined and published in AIP.

t_t

t_t is the latest time after which, in the event of non-termination of the DCL service, it is still possible for the aircrew to receive by voice procedures and in due time, the vocal departure clearance.

t_t shall be defined and published in AIP.

t0

t0 is the elapsed time between the sending by the aircrew of the departure clearance request (RCD message) and the notification to them of the FSM logical acknowledgement arrival, whenever this FSM is implemented.

t1

t1 is the timer, implemented in the ATS ground system that identifies the time between the sending by the ATS ground system of the CLD message and the reception by it of the CDA read-back of the CLD.

t2

t2 is the elapsed time between the sending by the aircrew of the CDA read-back and the notification to them of the FSM to the CDA.

Validation

According to Ref. [6] (para. 5.2.1) "validation of the requirements" is the process of ensuring that the specified requirements are sufficiently correct and complete.

Verification

According to Ref. [6] (para. 5.2.2) "verification of the Data link system" is the process ensuring that the implementations and operations satisfy the validated requirements.

1.4**ABBREVIATIONS**

ACARS	Aircraft Communication Addressing and Reporting System
ACK	Acknowledgement
AEEC	Airlines Electronic Engineering Committee
AFEPS	ACARS Front End Processor System (ARINC DSP)
AIP	Aeronautical Information Publication
AN	Aircraft Number
AOA	ACARS Over AVLK
AOC	Airline Operation Communications
ARP	Aeronautical Recommended Practice
ASP	AIRCOM Service Processor (SITA DSP)
ATA	Air Transport Association
ATC	Air Traffic Control
ATCC	Air Traffic Control Centre
ATM	Air Traffic Management
ATS	Air Traffic Service
ATSU	Air Traffic Service Unit
AVLC	Aviation VHF Link Control
CCITT	Consultative Committee for International Telegraphy and Telephone

CDA	DCL Clearance Echoback message, as defined in Ref. [1]
CLD	DCL Clearance message, as defined in Ref. [1]
CMU	Communication Management Unit
CRC	Cyclic Redundancy Check
DCL	Departure Clearance, as defined in reference [1]
DLASD	DataLink Application System Document
DLK	Data Link
DSP	Datalink Service Processor
FDPS	Flight Plan Data Processing System
FHA	Functional Hazard Analysis
FMEA	Failure Mode and Effect Analysis
FSM	Flight System Message, logical response, as defined in Ref. [1]
GES	Ground Earth Station
HMI	Human Machine Interface
IATA	International Airline Transportation Association
ICAO	International Civil Aviation Organisation
IOR	Interoperability Operational Requirement, as defined in § 1.3
ITR	Interoperability Technical Requirement, as defined in § 1.3
LRU	Line Replaceable Unit
MCDU	Multipurpose Control and Display Unit
MTBF	Mean Time Between Failure
MU	Management Unit
NACK	Negative acknowledgement
ORCAM	Originator Region Code Assignment Method, as defined in reference [12]
PDC	Pre-departure Clearance
PTR	Performance Technical Requirement, as defined in § 1.3
RCD	DCL Request, as defined in reference [1]
RGS	Remote Ground Station
SDU	Satellite Data Unit

SITA	Société Internationale de Télécommunication Aéronautique
SOR	Safety Operational Requirement, as defined in § 1.3
SSR	Secondary Surveillance Radar
STR	Safety Technical Requirement, as defined in § 1.3
UTC	Universal Time Coordinated
VDL	VHF Digital Link
VHF	Very High Frequency

1.5

REFERENCES

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CHAPTER 2

SYSTEM DESCRIPTION

2.1 OVERALL SYSTEM DESCRIPTION

The DCL data link system, which encompasses the three domains and related systems (Airborne system, Communication links and ATS ground system) and their interfaces are described in the section A.1 of APPENDIX A.

The communication environment can be characterised as a chain in which all the links interconnect to provide an end-to-end communication. These elements consist of sub-systems and other equipments that could be described within three interfacing domains. These domains work in cooperation but have their own functionality, environment, technical constraints and levels of security. The different domains are described in the following paragraphs.

2.2 DATA LINK SYSTEM DOMAINS

2.2.1 Guidelines used for Selecting Domain Boundaries

The rationale behind the definition of the domain boundaries are highlighted as follows:

- The domains are divided at specific interface communication levels,
- The domain definitions take into account the existing institutional and approval frameworks,
- The domain definitions take into account the existence of one entity which is the only one responsible for any potential modification and compliance to all requirements of a component within a domain,
- Such boundaries facilitate measurement and analysis of each domain (to show that the domain meets its allocated interoperability, performance and safety requirements).
- The boundary between airborne and communication domains takes into account that an aircraft undertakes a certification process, inclusive of operational approval procedure, and that the aircraft manufacturer/airline takes continued responsibility for all avionics on board, whether radios or not.

2.2.2 Domain Boundaries

As illustrated in Figure 2.2, the domain boundaries do not correspond to the location of the equipment. When referring to interoperability, performance and safety requirements of the data link system, it is convenient and appropriate to relate to the domains instead of the equipment locations.

Domain Limits	Boundary Definition
Aircrew / Airborne domain	Human Machine Interface between aircrew and avionics. This HMI belongs to the Airborne domain.
Airborne domain / Communication domain	At the airborne antenna.
Communication domain / ATS domain	At the communication links' final ground modem or adapter (i.e. data communication equipment connected to the ATS ground system).
ATS domain / Air Traffic Controller	HMI between ATS ground system and controller (or equivalent automation). This HMI belongs to the ATS domain.

FIGURE 2-2: DOMAIN BOUNDARIES

2.2.3 System requirements

The interfaces between the three sub-systems shall be defined as follows:

ITR_A 1 The Airborne system shall exchange messages with the Communication Links compliant to the "Air-Com" Interface defined in section A.1 of APPENDIX A.

ITR_C 1 The Communication Links shall exchange messages with the airborne system compliant to the "Air-Com" Interface defined in section A.1 of APPENDIX A.

ITR_G 1 The ATS ground system shall exchange messages with Communication Links compliant to the "Com-Ground" Interface defined in section A.1 of APPENDIX A.

ITR_C 2 The Communication Links shall exchange messages with the ATS Ground system compliant to the "Com-Ground" Interface defined in section A.1 of APPENDIX A.

Internetworking between SITA and ARINC networks for ED-85A based operations is technically in place.

NOTES: *Should specific implementations be based on the SITA BATAP specifications, the reference which is to be used is Ref. [16] as well as on the X.25 protocols defined in Ref. [8]. Should specific implementation be based on AX.25, the reference which is to be used is Ref. [9]. Should specific implementation be based on the ARINC network, the reference which is to be used is Ref. [17].*

CHAPTER 3

LIMITATIONS AND ASSUMPTIONS

3.1 TRANSITION GUIDELINES FOR INITIAL AIR/GROUND DATA COMMUNICATIONS SERVICES

The operational aspects contained in this document are based on the: "Transition Guidelines for Initial Air/Ground data communications services" document (Ref. [1]) produced by EUROCONTROL under the EATCHIP framework. This document defines the operational requirements for the Departure Clearance (DCL) data link service. The ED-85A document differs from Ref. [1] in the following terms:

- No reclearance capability is performed ,
- The term "ATSU", in order to avoid any confusion with the airborne equipment CMU/ATSU, is replaced hereafter by "ATS ground system",
- The term "Aircraft", which could encompass both aircrew and airborne equipments, is replaced by "Airborne system" or "Aircrew".

3.2 OPERATIONAL ENVIRONMENT

The considered DCL service's operational environment can be described as follows:

- Density of Traffic: 150 aircraft/hour, as estimated in reference [11],
- Peak Number of Departure Clearance/hour per controlling position: 112 as estimated in reference [11] (Estimation for year 2000)
- Maximum instantaneous DCL requests per ATS ground system: 50
- Service Coverage: airport perimeter, for the aircraft on the ground.

This operational environment is the maximum environment assumed in this document.

The requirements and the safety analysis contained in this document are also valid for less stringent operational environments. In these environments, ATS providers could downsize their ground system and still be compliant with the requirements of this document.

However, the requirements and the safety analysis contained in this document are not valid for more stringent operational environments, since the assumptions of the safety analysis of Chapter 6 are no longer valid. Additional study would be required in order to ascertain if this document could be made applicable for more stringent operational environments.

In addition to these characteristics, the description of the operational environment contains:

- an operating mode, on which the ATS procedures to deliver the departure clearance via data link are based, as described in Chapter 4;
- a time sequence diagram (Figure 4.1) identifying, for the operational environment assumed, maximum acceptable delays for messages to be delivered, and timeouts for alarms/revert to voice procedures to be triggered;
- an availability target for the data link system, under which the controller and aircrew would refuse to use the data link system, specified in section 5.2.1;
- a maximum number of messages which can be corrupted, above which the controller and aircrew would refuse to use the data link system, specified in section 5.2.2;

- a maximum number of messages which can be received and corrupted without being detected, above which the controller and aircrew would refuse to use the data link system, and the ATM overall efficiency and safety may be degraded, specified in section 6.3.3;
- a maximum number of messages which are never received by the appropriate entity and can be considered lost, above which the controller and aircrew would refuse to use the data link system, and the ATM efficiency would be degraded (delays for departures etc.), specified in section 5.2.3;
- a maximum end-to-end delivery time for the DCL messages, above which the controller and aircrew would refuse to use the data link system, specified in section 5.2.5.

3.3 IDENTIFICATION OF THE SPECIFIC EXPECTED BENEFITS

As defined in reference [1]:

- Reduction of the potential for communication errors between aircrew and controller,
- Reduction in aircrew workload,
- Reduction in controller workload,
- Automatic validation of flight plan in the ground Air Traffic Systems,
- Automatic preparation of clearance and information elements,
- Reduction of radio frequency channel congestion,
- Reduction of ground delay.

3.4 ASSUMPTIONS MADE ON THE INFRASTRUCTURE

These assumptions are not safety related as their validity or non-validity has no impact on the classification of a failure condition higher than minor (Chapter 6).

These assumptions relate to the possible infrastructure expected to implement and operate the Departure Clearance service over ACARS as described in this document.

Airborne high level characteristics:

- An ACARS router
- An HMI
- A data link bearer (e.g. VHF or Satellite)

Communication high level characteristics:

- Voice VHF and air-ground (e.g. VHF, Satellite) datalink communication links,

NOTE: *ACARS over AVL (AOA) is transporting ACARS ARINC 620 messages using ACARS routing over VHF Digital Link (VDL) Mode 2 Data link Layer. The Data link Layer of VDL Mode 2 is called Aviation VHF Link Control (AVLC). VDL Mode 2 is capable of transporting ACARS messages and offers a factor of 10 improvement in effective data rate. AOA and ACARS can be used indifferently since there is no impact on the requirements defined in this document.*

- The SITA AIRCOM service or the ARINC ACARS service is the potential communication systems used in Europe.

ATS high level characteristics:

- A Flight Plan information service is available, with preferably a Flight Plan processing system,
- An ATS ground system with data link capabilities is available.

3.5 OTHER ASSUMPTION

It is assumed that the SSR code (an element of the Departure Clearance) is delivered according to the ORCAM policy for the assignment of SSR Codes, as defined in reference [12].

CHAPTER 4

OPERATING METHOD AND INTEROPERABILITY REQUIREMENTS

This chapter gives a description of how the DCL service is used by the aircrew and controller in the assumed operational environment (paragraph 3.2).

4.1 SERVICE ACCESS

4.1.1 Initiation of the Service

IOR_A 1 The DCL service shall be initiated by the aircrew (RCD sending) at a suitable time between t_i and t_l .

t_i shall be the earliest time at which a DCL service can be initiated. It should be defined according to the availability of FDPS (Flight Data Processing System) data in the ATS ground system.

t_l shall be the latest time after which, an Aircrew, having not completed the DCL service (as defined in IOR_A 2), is still able to receive by voice procedures and in due time, the vocal departure clearance.

t_i and t_l shall be defined and published in the AIP.

4.1.2 Termination of the Service

IOR_A 2 The DCL service shall be completed before t_l (as defined in IOR_A 1) on reception by the Aircrew of the FSM in response to the CDA.

4.2 SERVICE DESCRIPTION

4.2.1 Overview of DCL service exchanges

The following Figure 4.1 gives an overview of the message exchanges which are detailed hereafter.

In the following Figure 4.1, options and alternatives are identified, allowing for the implementation of DCL systems, which are either fully automated or which have the Air Traffic Controller in the loop.

The different options presented in Figure 4.1 can be implemented separately with two exceptions:

- if option 3 is implemented then option 2 has to be implemented too,
- if option 5 is implemented then option 4 has to be implemented too.

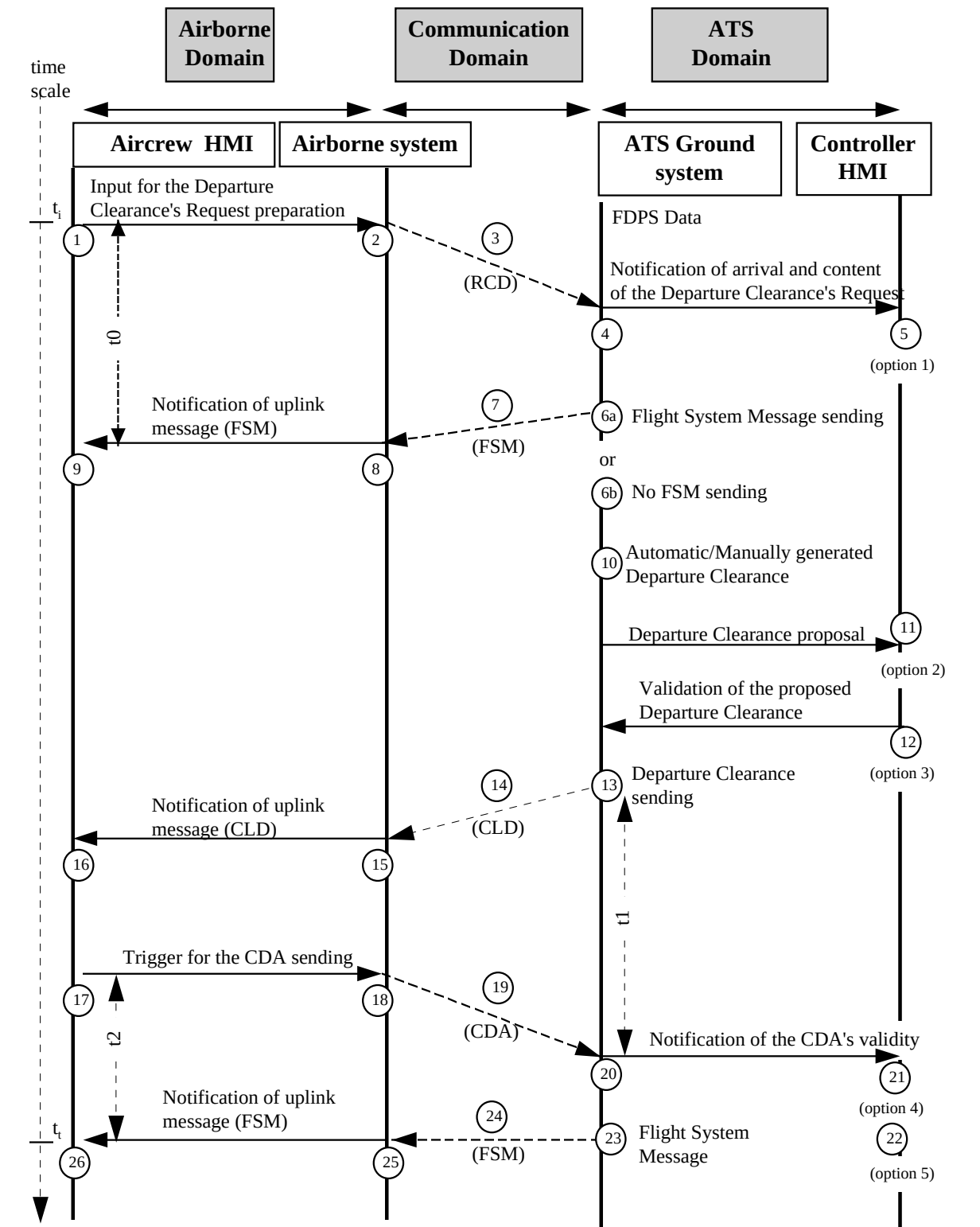


FIGURE 4-1 - DEPARTURE CLEARANCE SEQUENCE DIAGRAM

4.2.2 Detailed description of Normal and Degraded Modes

Step	Normal Mode	Abnormal Mode	Response to Abnormal mode
1	IOR_A 3 The Aircrew shall prepare the Departure Clearance Request on the appropriate Airborne Interface. The Aircrew shall trigger the RCD sending between t_i and t_r (as defined in IOR_A 1).	1 - Incomplete RCD prepared by the Aircrew. 2 - Too early sending of the RCD. 3 - Too late sending of the RCD.	ITR_A 2 The Airborne system shall check that the aircrew entries are complete and it shall inform him in the event of an error. 2 - as in step 4-4 or step 4-5. 3 - Nil.
2	ITR_A 3 The Airborne system shall format any downlink DCL message (RCD or CDA) in compliance with APPENDIX A and chapter 5 of Ref. [3]. ITR_A 4 The Airborne system shall fill in the supplementary address field defined in Ref. [5] with the 4 letter ICAO designator of Departure Airport of APPENDIX A and shall send the RCD to the communication links.		
3	ITR_C 3 The Communication service provider shall maintain an unambiguous correlation between the 4 letter ICAO designator of Departure Airport of APPENDIX A and their internal communication service address (e.g. 7 letters). The use of this four letter ICAO designator of Departure Airport shall be coordinated with the ATS provider in charge of the corresponding Airport. ITR_C 4 The communication links shall route any downlink DCL message (RCD, CDA) having a valid destination address to the ATS ground system.	1 - The communication links are not available due to: a - No link between Airborne transmitter and ground station receiver, b - Ground/Ground network unavailable.	1 - a- ITR_A 5 In case of no link between Airborne transmitter and ground station receiver, the Airborne system shall inform the Aircrew (e.g. "NOCOMM" message). IOR_A 4 When the aircrew is notified by the Airborne system that there is no link between the Airborne transmitter and the ground station receiver (e.g. "NOCOMM" message), he shall revert to voice procedures. b- IOR_C 1 The communication service provider shall inform the ATCC of the unavailability of ground/ground network within a specified time after detection of unavailability (or before a predictable unavailability). IOR_A 5 If the Aircrew has not completed the DCL service before t_r (completion as defined in IOR_A 2), he shall revert to voice procedures.