AGDL System Requirements - Final TS 2016

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Abstract

This document contains the updated System Requirements Specification of the ATC system that supports the Airport and En-Route & Approach ATC information exchanges with the aircraft via Data-link (AGDL).

AGDL System requirements are mainly based on the existing AGDL Air Services System Requirements, on the project scope of Enhanced Datalink Services (directly derived from EUROCAE WG-78/RTCA SC-214 "Interim Draft Standard": Data Communications SPR and INTEROP Rev H that comprises Operational and Technical requirements), as well as on the close coordination with WP9, WP10 and WP12 data link related activities and inputs.

The document is produced as a continuation of the previous deliverable P10.7.1-D75.

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Rational for rejection
None.

7 Document History

Edition	Date	Status	Author	Justification
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00.00.02	31/08/2016	Draft	████████	Update after internal review

00.00.03	05/09/2016	Draft		Update After Internal review
00.01.00	07/09/2016	First issue		
00.01.01	16/11/2016	Final		Update after closure gate actions

1

2 Intellectual Property Rights (foreground)

3   This deliverable consists of SJU foreground.

1 Table of Contents

4

5   **List of tables**

16

17   # List of figures

26

1 Executive summary

Nowadays, the Data Link concept is being progressively implemented, but due to the specificity of its implementation (i.e. it requires the installation of new aircraft equipment), it is not fully developed yet. Therefore, there are some on-going initiatives, which will set a base for the findings of this technical specification and the associated ones: These initiatives are the CASCADE and Link 2000+ programmes.

Related to further evolution of aircraft and ground based equipment to cope with more advanced datalink communications are the on-going datalink definition activities, being held by the international joint EUROCAE Working Group (WG-78)/RTCA Special Committee (SC-214) (Standards for Air Traffic Data Communication Services). These definition activities intend to support SESAR and the U.S. NextGen Air Transportation System programmes. The Safety, Performance and Interoperability requirements (i.e. reflected in SPRs and INTEROP documents being developed by WG-78/SC-214) form the baseline for SESAR Step 1 at least.

This Air Traffic Services (ATS) Data Communications baseline will be prototyped and verified in the scope of this project.

The main objective of this project is to define and to validate enhanced datalink features required for IP2, to be built upon work started in LINK2000+ and CASCADE programmes. In particular, this project will pursue the following objectives

- ✈ Specification of the ATC system support to the Airport and En-Route & Approach ATC information exchanges with the aircraft via Datalink;
- ✈ Development of prototypes for the validation of the Datalink Information Exchanges;
- ✈ Standardisation of the SESAR Pre-SWIM enhanced datalink services.

The purpose of this document release is to provide a final list of 10.7.1 requirements, taking into account operational requirements and outcomes of 10.7.1 support to validation activities.

NOTE: In this document, the requirements are organized in the same subsections than in the first version of this TS [8], to keep the traceability with the verification plan; but some subsections become not applicable.

1 Introduction

This is the document used to provide the capability for users and providers to support verification and validation activities associated with the data communications needs of future Air Traffic Management concepts derived from Single European Sky Air Traffic Management Research (SESAR) initiatives. This document will be updated as necessary from the validation activities conducted during the SESAR Storyboard Step-1.

Figure 1 provides an overview of the CNS/ATM system and its elements. These elements comprise the operator provisions, the aircraft system, the air traffic service provider (ATSP) provisions, and air-ground communications service provisions (ACSP). Air-ground communications services may be provided by an ACSP or an ATSP can also provide this service itself.

More than one ATSU may be involved in the provision of data communications services and may require inter-facility communications between the involved ATSPs. This ground-ground interoperability is however out of scope for this P10.7.1.

In addition, flight information data may be exchanged between the sources, where the flight information data resides, and an ATSU.
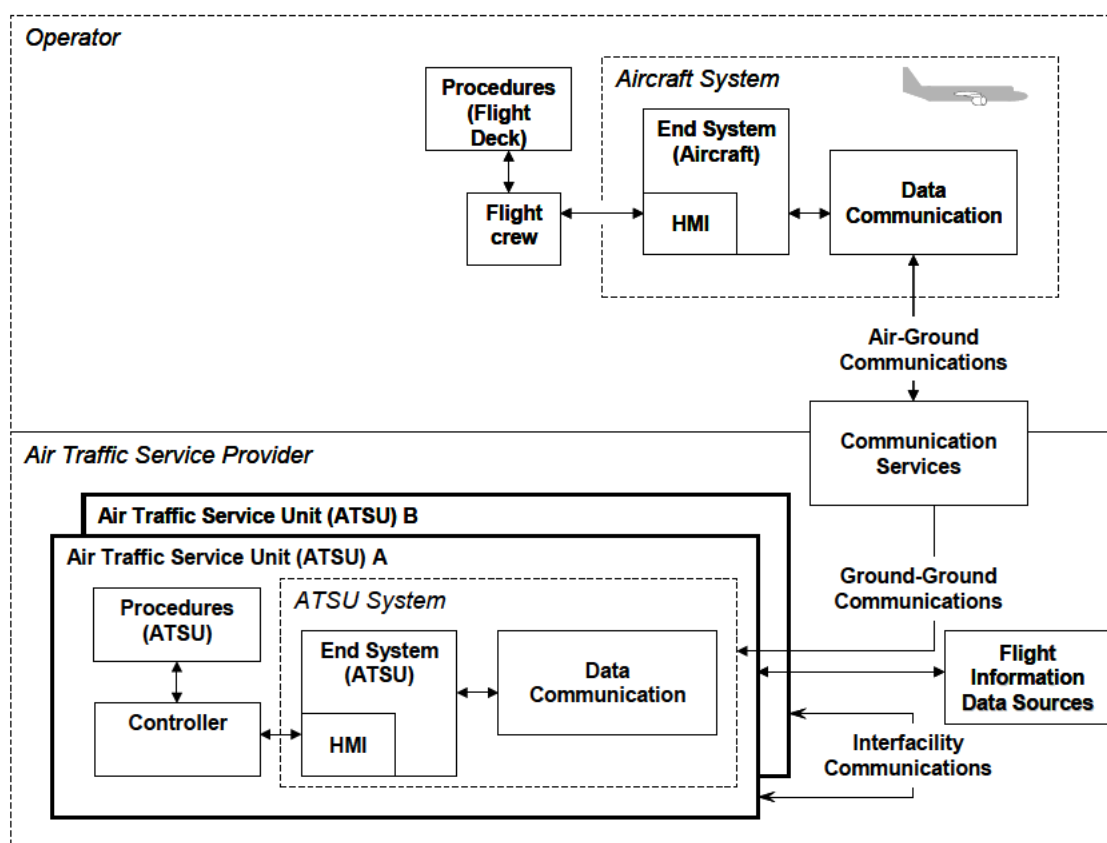
Figure 1: Overview of the CNS/ATM System

BACKGROUND:

The SESAR 10.07.01 prototypes are based on the requirements specified by the EUROCAE/RTCA standardization group WG-78/SC-214, as indicated in other SESAR 9.1 and 9.33 deliverables.

Revision H of the standardization documents [1] [2] [3] [4] was released and serves as a baseline for the SESAR 10.07.01 project Phase 1a and 1b. All mandatory functionality related to the services (e.g. DLIC, ACM, AMC, ACL, DCL, 4DTRAD) which are in the scope for the particular prototypes, as indicated in the SESAR 10.07.01 PIR [7], will be implemented, with the exception that D-OTIS service is not implemented.

After the revision H of the standardization documents was finished in the EUROCAE/RTCA standardization group WG-78/SC-214, validation work has started. Validation work is conducted by various SESAR and non-SESAR projects. As a result of the validation effort, various needs for changes in the standardization documents were identified and will be identified by the EUROCAE/RTCA standardization group WG-78/SC-214. For this reason, SC214/WG78 CSG Bugzilla application was set up [32].

In the SC214/WG78 CSG Bugzilla system, identified issues are being logged and related discussions and achieved consensus on proposed solutions are being tracked in the forms of Proposed Defect Reports - PDRs. During the standardization meetings, open PDR issues are discussed, proposed solutions are being evaluated and after a solution consensus is reached, PDRs are closed. All closed PDRs are categorized from the point of view of the impact on the interoperability of the concerned ATM services. In certain cases, PDRs are being categorized as mandatory for implementation to ensure the interoperability. For the total P10.7.1 project these PDRs, categorized as mandatory, will be implemented in the platform prototypes to ensure the interoperability with the ground systems during the planned validation exercises. For the P10.7.1 Phase 1a only a mutually agreed number of PDRs are part of the Phase 1a baseline. This set of PDRs has been agreed between the 9.1/9.33 and 10.7.1 partners.

1.1 Purpose of the document

The purpose of this technical specification is to collect the system requirements (functional and Non-functional) regarding enhancement data link communications and surveillance applications, and their associated advanced data link services, being standardised WG-78/SC-214 "Interim Draft Standard" (i.e. Data Communications SPR and INTEROP Rev H as released per February 2010 [1] plus some agreed PDRs list included in Appendix B). Although the WG-78/SC-214 "Interim Draft Standard" covers the total 4DTRAD concept this P10.7.1 is limited to building the data link related systems only, e.g. AMAN, ground-ground interoperability are excluded.

The scope of this document is the ATS Applications that support the following continental air traffic services (ATS):

- Context Management (CM) data communications application supporting:
    - Data Link Initiation Capability (DLIC) data link service;
- Controller Pilot Data Link Communication (CPDLC) data communications application supporting:
    - ATC Communications Management (ACM) data link service,
    - ATC Microphone Check (AMC) data link service,
    - ATC Clearances (ACL) data link service (including support to Air Traffic Situation Awareness-In Trail Procedure -ATSA-ITP-),
    - Departure Clearance (DCL) data link service,
    - Data link Taxi (D-TAXI) service,
    - 4D Trajectory Data link (4DTRAD) service;
- ATN Automatic Dependent Surveillance - Contract (ADS-C) data communications and surveillance application supporting:
    - 4D Trajectory Data link (4DTRAD) service (including Flight Path Intent –FLIPINT-datalink service); and

The first release of the requirements document (D2) was covering the P10.7.1 Phase 1a for which validation are planned as from November 2011. For the additionally planned 2 iterations (2014 and 2015) an evolution of this requirements document was anticipated.

This document is an update of the previous 2014 TS Update deliverable D87, which includes the necessary changes after all validation activities.

1.2 Intended readership

This AGDL Technical Specification is primarily intended for use by project 10.07.01 as a foundation for developing the Enhance Datalink Features for All Phases of Flight for SESAR steps 1.

This specification is also intended as a coordination tool for the following operational and technical projects:

- ✓ P04.03: operational inputs provider
- ✓ P05.06.01: operational inputs provider
- ✓ P06.03.01 operational inputs provider
- ✓ P06.07.02 operational inputs provider
- ✓ P06.07.03 operational inputs provider
- ✓ P10.01.07 to consolidate system requirements and maintaining consistency
- ✓ P9.1 to be consistent between aircraft and ATC system to support i4D function.
- ✓ P9.5 to be consistent between aircraft and ATC system to support ASPA S&M function
- ✓ P9.13 to be consistent between aircraft and ATC system to support D-Taxi Clearance function.
- ✓ P9.19 to be consistent between aircraft and ATC system to support High-Level SWIM A-G Architecture and Functional Requirement Specification.
- ✓ P9.33 to be consistent between aircraft and ATC system to support CPDLC Departure Clearance (DCL) and the ATS in approach services D-OTIS and D-ATIS. SWP9.33 is also acting as overall data link project at Airbus and covering the modification to the airborne-ATSU, the interface system between air and ground, and integrating all the SWP9.x related data link projects.
- ✓ P12.1.7 to consolidate system requirements and maintaining consistency

1.3 Inputs from other projects

	Document Title	Document identification	Authorized by
LINK2000+	ATC Data Link Operational Guidance for LINK2000+ Services	Version: 5.0 Edition Date: 30 June 2009	EUROCONTROL
CASCADE	Cooperative ATS through Surveillance and Communication Applications Deployed in ECAC	Version: 1.1 Edition Date: 3 Nov 2004	EUROCONTROL
EMMA 2	European airport Movement Management by A-SMGCS, part 2	Version: 1.0 Edition Date: Dec 2008	EMMA 2
ADAPT	Aircraft Data Aiming at Predicting the Trajectory	Version: 1.0 Edition Date: Dec_2008	EUROCONTROL
ADAPT II	ADAPT2 Aircraft Data Aiming at Predicting the Trajectory	Version: 1.0 Edition Date: Dec_2009	EUROCONTROL
NUP, NUPII and NUPII+	North European ADS-B Network (NEAN) Update Programme Final Report	Version: 1.0 Edition Date: Sept 2008	TEN-T

	Document Title	Document identification	Authorized by
ATN INTEROP	Interoperability Requirements Standard For Advanced ATS Data CommunicationS	Version H Edition Date: 03-Feb-2010	WG-78/RTCA SC-214
ATN SPR	Data Communications Safety and Performance Requirements		WG-78/RTCA SC-214
FANS 1/A - Advanced Services - INTEROP	Future Air Navigation System 1/A Accommodation for Advanced Services in the ATN Environment Interoperability Standard	Version H Edition Date: 03-Feb-2010	WG-78/RTCA SC-214
[iTEC-eFDP]	iTEC - eFDP System Requirements Specification (SRS)	Core iTEC V1_eFDP_SRS_1.0_2009-06-0	DFS
[4Flight]	4-FLIGHT CFT PREPARATION PHASE USER REQUIREMENTS DOCUMENT	V 3.2 dated 04/02/10	ENAV/DSNA

Table 1 Baseline References

1.4 Structure of the document

Chapter 1: Purpose and scope; Requirements structure; System/Subsystem purpose and high level overview

Chapter 2: General system/subsystem description; system modes and states, Operational scenarios and ATS Functional decomposition

Chapter 3: Functional and Non-Functional Requirements

Chapter 4: Assumptions

Chapter 5: Referenced documents

Appendix A: CPDLC and ADS-C Application Messages (i4D, D-TAXI and DCL)

Appendix B: PDRs List for i4D

Appendix C: Gap Analysis

1.5 Requirements Definitions – General Guidance

Each requirement must be uniquely labelled and expressed respect to the other requirements so you can refer to it unambiguously.

The adoption of a standard for naming requirements is necessary to avoid ambiguities while referring to requirements. Hereafter we will call PUID (Project Unique Identifier), the unique identifier assigned manually or automatically to each system requirement. As indicated in the *Requirements and V&V Data Structures and Writing Guidelines* document, the naming convention shall be the following:

[Object_type]-[Project_code]-[Document_code]-[Reference number 1]- [Reference number 2] .

The Object Type for this kind of document is "REQ".

The Project Code for this document is "10.07.01".

The Document Code for this document is "TS" Technical Specification.

Each **Reference Number** is a sequence of digits, each project manages its logic as to the split between **<Reference number 1>** and **<Reference number 2>**. Each reference number is a sequence of four digits (e.g. 0000, 0027, 9734).

1 For example, the identifier:

2

3 **REQ-10.07.01-TS-0011.0023** refers to a requirement written by the 10.07.01 project, reported
4 inside the Technical Specifications requirement (TS) document within section 1.1 with the
5 requirement referent number 0023.

6

7 [REQ]

Identifier	
Requirement	
Title	
Status	
Rationale	
Category	
Validation Method	
Verification Method	

8
9 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	Enabler code	<Full>
<SATISFIES>	<ATMS Requirement>	INTEROP or SPR Requirement Identifier	<Full>
<ALLOCATED_TO>	<Functional block>	Functional block Identifier	N/A
<APPLIES_TO>	<Operational Focus Area>	Operational Focus Area Identifier	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A
<ALLOCATED_TO>	<Project>	Project Identifier	N/A

10 Table 2: Requirements layout

11

12 The term "shall" denotes a mandatory requirement.

13 The term "should" denotes recommendation or best practice.

14 The term "may" denotes an optional element

15 1.6 Functional block Purpose

16 This Technical Specification describes the ER/APP functional blocks "Air/Ground Datalink services"
17 and "Air/Ground Datalink communications" that is included in the high level illustration from the
18 Technical Architecture Descriptionand that has been reproduced in the figure below.

19
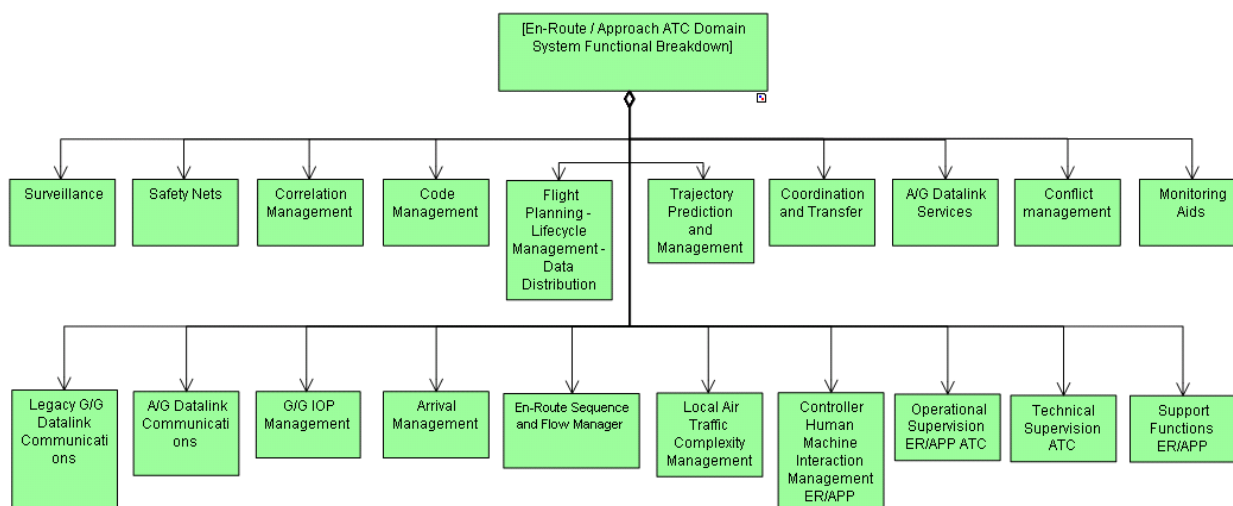
20
21 **Figure 2: ER/APP Functional Blocks**

22

1 The purpose of air-ground data-link functional blocks provided by P10.7.1 project is to develop and
2 verify enhanced datalink services, initially compliant with the WG-78/SC-214 "Interim Draft Standard"
3 available at the beginning of P10.7.1 project (i.e. Data Communications SPR and INTEROP Rev H;
4 With one exception for the ACL data link service evolutions to be made to support the ASAS ATSA-
5 ITP, DCL and DTAXI messages: i.e. use of the next version Rev I instead), and finally compliant with
6 the final WG-78/SC-214 SESAR data communications standard that will have been updated
7 considering the outcome of the initial development and verification phase of this project.

8 In the scope of airport datalink services the P10.07.01 has covered the DCL and D-TAXI. The
9 purpose of services is provided to the ground ATC functions the datas to perform the routing and
10 guidance by means ground datalink services. A view of Aerodrome Functional Block is depicted
11 below.

12
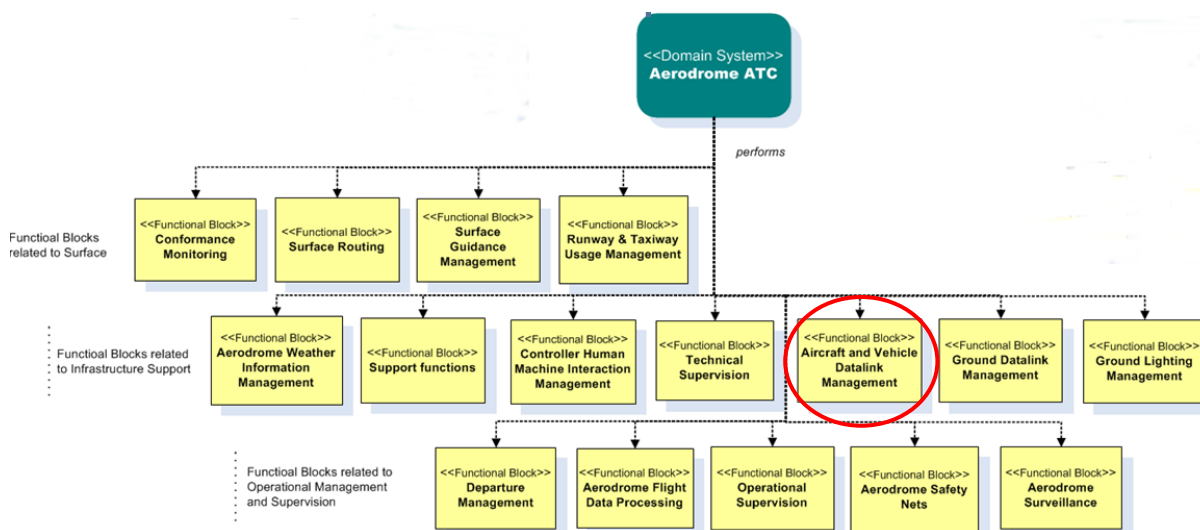
13

14 **Figure 3: Aerodrome Functional Blocks**

15 **Aircraft and Vehicle Datalink Management**: This functional block is responsible for the air-ground
16 communication. Its main role is to handle datalink messages, supporting the exchange of the
17 messages between the TWR and the vehicles and/or the aircraft-aircraft on ground

18

19 Also an ATN/IPS feasibility study [10] has been performed in order to see the potential benefits of
20 adding ATN/IPS stacks as follow:

21 • Cost-effectiveness, using standard equipment and having a lot of competence available when
22   using internet technology instead of outdates OSI-based infrastructure.

23 • Increased bandwidth

24 • Embedded security feature.

1.7 Functional block Overview

26 The air-ground datalink communications/services functional blocks evolutions (and associated
27 prototypes) anticipated in the frame of this 10.07.01 project, as well as the foreseen impact on related
28 air-ground datalink communication services are the followings:

29 • Evolution of existing basic datalink services (e.g. Addition of new message in existing datalink
30   message sets; Individual datalink message data fields; Change in the ordered sequence of
31   datalink messages for a given datalink service): i.e. DLIC service based on the AFN and CM
32   applications; ACM, ACL (including AGDL support to the ASAS ATSA-ITP applications), AMC
33   and DCL services based on enhanced CPDLC application;

1　　• Creation of new enhanced datalink services aiming at supporting the SESAR 4D trajectory
2　　　based concept in the course of the IP2 time frame: i.e. D-TAXI, DCL, 4DTRAD and Trajectory
3　　　Negotiation services based on enhanced CPDLC and ADS-C applications; ADS-C application
4　　　enhancement to support Ground TP enhancement;

5　　• Validation and Verification of Interoperability of future ATM-systems basing on datalink
6　　　operations, will be targeted by the project. The industrial partners with their three major ATM-
7　　　system baselines and the ANSP-partners, currently operating these three baseline ATM.-
8　　　systems, provide unique possibilities for crosscheck of interoperability issues in a unique
9　　　environment.

10　An important expected outcome from this project is the prototyping and verification of those datalink
11　services required to support "Initial 4D" operations (i.e. datalink services and application to support
12　the i4D avionics package being developed in the frame of P9.1). However, i4D is not the only air-
13　ground datalink based concept element targeted by this project (e.g. other datalink service like D-
14　TAXI, is also intended to be addressed).

15
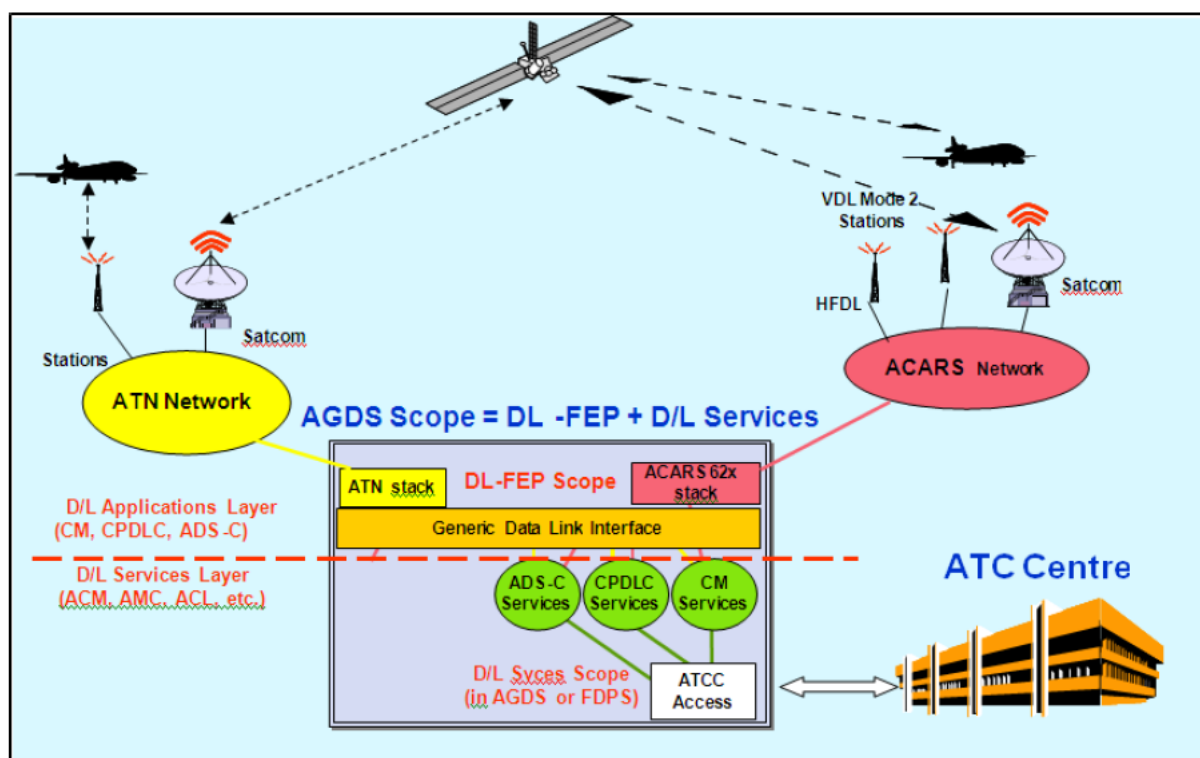
16　**Figure 4:** Functional Blocks Overview

17

18

19　## 1.8　Glossary of terms

Term	Definition
4D Trajectory	The 4D Path of the aircraft through airspace.
4DTRAD Service Area	A volume of airspace in which the 4DTRAD service is used. It may begin shortly after an aircraft is airborne, or at a waypoint along the route of the aircraft.
4DTRAD Service Provider	The C-ATSU and D-ATSUs for a flight plus any relevant flow control units, and the brokering function in 4DTRAD service area. *Note: This is a notional concept of the ground system to allow the operating methods to be intentionally vague about which ground actors exist and what functions they perform*
A	

Term	Definition
Abstract Syntax Notation One (ASN.1)	An international standard for specifying data.
Aerodrome	A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of an aircraft. [ICAO]
Aeronautical Telecommunication Network (ATN)	The ATN comprises application entities and communication services which allow ground, air-to-ground and avionics data sub-networks to interoperate. Can include in its meaning the ATN applications such as CM, CPDLC, and ADS-C.
Application process	A set of resources, including processing resources, within a real open system which may be used to perform a particular information processing activity.
ATN end system (ATN ES)	The portion of the end system (ES) that implements the application entities as defined in ICAO Document 9880.
Aircraft address	A unique combination of 24 bits available for assignment to an aircraft for the purpose of air-ground communications, navigation and surveillance.
Aircraft flight identification	A group of letters, figures or a combination thereof, which is either identical to, or the coded equivalent of the aircraft call sign to be used in air-ground communications, and which is used to identify the aircraft in ground-ground ATS communication. Per ICAO Document 9880 Sub-Volume 1
Aircraft identification	A group of letters, figures or a combination thereof, which is either identical to, or the coded equivalent of the aircraft call sign to be used in air-ground communications, and which is used to identify the aircraft in ground-ground ATS communication. Per ICAO Doc 4444-ATM/501 Chapter 1.
Aircraft System	The aircraft system as referred to in this document includes all sub-systems associated with data communications on an aircraft.
Air Traffic Control Clearance	Authorization for an aircraft to proceed under conditions specified by an air traffic control unit. Note 1: For convenience, the term "air traffic control clearance" is frequently abbreviated to "clearance." Note 2: The abbreviated term "clearance" may be prefixed by the words start-up", "push-back", "taxi", "take-off", "departure", "en-route", "approach" or "landing" to indicate the particular portion of flight to which the air traffic control clearance relates. [ICAO]
Air Traffic Control instruction	Directives issued by air traffic control for the purpose of requiring a pilot to take a specific action. [ICAO]
Air Traffic Control service	A service provided for the purpose of: a) Preventing collisions between aircraft, and on the manoeuvring area between aircraft and obstructions; and b) expediting and maintaining an orderly flow of air traffic [ICAO]
Air Traffic Management	The aggregation of the airborne functions and ground-based functions (air traffic services, airspace management and air traffic flow management) required to ensure the safe and efficient movement of aircraft during all phases of operations.
Air Traffic Service	A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service). [ICAO]

Term	Definition
Air Traffic Service function	An application of air traffic services or portions thereof that satisfies an operational need.
Air Traffic Services Unit (ATSU)	A generic term meaning variously, ATC unit, flight information center, or ATC service area control services reporting office. In this document, ATSU refers to both human operators (e.g., Controllers) and automated systems (e.g., data processing systems) at an ATSU, unless specifically stated otherwise.
Approval	A document by which an authorized body, acting within a legislative framework, gives formal recognition that a product, process or service/operation conforms to applicable requirements.
Approval Process	A process by which an authorized body, acting within a legislative framework, gives formal recognition that a product, process or service/operation conforms to applicable regulatory requirements.
Area Navigation (RNAV)	A method of navigation which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of capability of self-contained aids, or a combination of these.
ATS provider	An appropriate ATS authority in a given airspace.
ATSP system	The total ATS provider system including the technical system and operational procedures.
Automatic Terminal Information Service	The automatic provision of current, routine information to arriving and departing aircraft throughout 24 hours or a specified portion thereof: Data link-automatic terminal information service (D-ATIS). The provision of ATIS via data communications. Voice-automatic terminal information service (Voice-ATIS). The provision of ATIS by means of continuous and repetitive voice broadcasts. [ICAO]
B	
Baseline ADS-C report	Used in event ADS-C contracts, when the sending of an ADS-C event report is dependent on comparing a given ADS-C parameter with a reference parameter. The ADS-C baseline report establishes the reference parameter value(s). Sent in response to receipt of an ADS-C event contract requiring a baseline report; not upon occurrence of the specified event.
Brokering function	A function of the 4DTRAD service provider responsible for collating the input from all ATSUs and any flow control entities interested in the flight and deciding on the best constraints to be put on the aircraft .
C	
Clearance	See air traffic control clearance
Communication Services	The delivery of data messages and/or voice between end systems.
Clearance limit	The point to which an aircraft is granted an air traffic control clearance. A clearance limit is described by specifying the name of the appropriate significant point, or aerodrome,
Computed Waypoint	Waypoints that are defined by reaching an altitude or flying on a heading, and are thus not fixed. *(REF: ICAO Doc 9694 PART III, draft 12)* Computed waypoints are computed by the FMS and may also include for example, top-of-descent or climb points.
Constraint	Any cleared limitation on the aircraft's cleared route. This term is used generically to refer to time, speed or level constraints, issued to the aircraft that restrict the options of the flight crew or FMS on how the aircraft is to be flown. This data is issued as a clearance.

Term	Definition
Continuity	The probability that a transaction completes within the expiration time
Controlled Time Over (CTO)	Used to describe constraints originating from ATC, and only when discussing proposed time constraints that have not been sent to the aircraft. A CTO may be specified as AT, At/Before, or At/After, and can include a specification of the allowable tolerance in meeting the constraint
Controller Pilot Data Link Communication	Application that allows data communications between Controllers and pilots together with end-to-end protection of message integrity by an application level integrity check that also provides assurance of correct delivery.
Current ATSU (C-ATSU)	The ATSU that can exchange ATC communications messages with an aircraft
Current Controller	The controller responsible for the sector or that has the current control authority over the aircraft.
D	
Development assurance	Planned and systematic actions performed to minimize generic errors during development and implementation, and provide confidence that the system is suitable for its intended use. [RTCA DO-264/ EUROCAE ED-78A]
D-OTIS Request	Any downlink message from pilot for ATIS, NOTAM, VOLMET, full NOTAM or OTIS shall be called a request.
D-OTIS Response	The resulting uplink message is a response.
D-OTIS Demand	A demand is a one shot single request. One or more responses can be generated by a demand. A demand can contain a demand for ATIS info, NOTAM info, VOLMET info or OTIS info
D-OTIS Contract	A contract is a request for initial response and automatic notification of subsequent modifications.
D-OTIS Termination	Termination is the stopping of all contracts.
E	
End System (ES)	A system that contains the OSI seven layers and contains one or more end user application processes.
EPP Report	The ADS-C application is designed to give automatic reports from an aircraft to an ATC related ground system. ATC specifies the kind of ADS-C contract (on demand, on a periodic basis, or triggered by an event) to establish with the aircraft. The ADS-C "EPP report" is a key concept in INITIAL 4D: it includes mainly data from 4D predicted trajectory (computed on FMS side).. Events of the "On event" EPP report are configured by ATC so that any non-conformance to the 4D trajectory is triggered (which results in an automatic downlink of the related "EPP report"). In case of "periodic" contract, ATC define the update rate.
Estimated off-block time (EOBT)	The estimated time at which the aircraft will commence movement associated with departure. [ICAO]
Enabled	In the context of CPDLC, refers to a connection, which has been activated for operational exchanges. To become enabled, a CPDLC connection must have CDA status in accordance with ICAO Document 9880 and must have satisfied specific additional requirements specified in this document.
F	
Failure of Integrity	The probability that a transaction completes with one or more undetected errors
Flight information service	A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights. [ICAO].

Term	Definition
Flight plan	Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft. [ICAO] A flight plan can take several forms, such as: Current flight plan (CPL). The flight plan, including changes, if any, brought about by subsequent clearances. *Note: When the word "message" is used as a suffix to this term, it denotes the content and format of the current flight plan data sent from one unit to another.* Filed flight plan (FPL). The flight plan as filed with an ATS unit by the pilot or a designated representative, without any subsequent changes. *Note: When the word "message" is used as a suffix to this term, it denotes the content and format of the filed flight plan data as transmitted.* Repetitive flight plan (RPL). A flight plan related to a series of frequently recurring, regularly operated individual flights with identical basic features, submitted by an operator for retention and repetitive use by ATS units. Aircraft flight plan. The flight plan used by the flight crew. The sequence of legs and associated constraints that define the expected 3D or 4D trajectory of the aircraft from takeoff to landing.
I	
Initiator	A human and/or machine party that initiates a transaction. *Note: In some cases a human and a machine may both contribute to the initiation of a message. For example, a human may create a route clearance message and a machine may conduct a conflict probe check on that message and/or append an altimeter setting before it is released for protocol encoding and onward transmission.*
L	
Lateral Waypoints	Fixed waypoints used to define the route of flight (including both en-route waypoints and those contained in terminal area procedures); Wherever a lateral (parallel) offset will be initiated or reached; Wherever the return from a lateral (parallel) offset will be initiated or completed. (REF: ICAO Doc 9694 PART III draft 12)
Lateral Type	Indicates the type of the reported waypoint in the lateral profile, amongst the following values : • To *(next waypoint)* • Offset start *(where aircraft leaves the parent path)* • Offset reached *(where aircraft reaches the offset path)* • Return to parent path initiation *(where aircraft initiates its return to the parent path)* • Offset end *(where aircraft reaches the parent path)* • Offset *(waypoint which is on an offset path abeam a waypoint on the parent path)* • Overfly *(waypoint to be overflown – this changes the way to build the trajectory in case of turn)*
M	

Term	Definition
Maximum allowed RTA speed schedule	This maximum allowable RTA speed schedule parameter corresponds to the maximum speed at which the airline (or the crew) agrees to operate the a/c in INITIAL 4D operations. It is expressed as a CAS/MACH couple. It is taken into account by the system as the new maximum operating speed (for guidance and predictions) when a RTA is entered in the active flight plan.
N	
Normal means of communication	Communication capability that is required for operational approval.
O	
Open Message	A (CPDLC) message requiring a response for which the closure response has not yet been received.
Operational Requirement	An Operational requirement is a requirement which is imposed on the system/user to meet the operational objective. Operational requirements may take various forms, including organizational, operational, procedural, functional, performance, and interoperability requirements.
Operator	A person, organization or enterprise engaged in or offering to engage in an aircraft operation.
P	
Predicted winds	Predicted winds are the winds used in predictions computation.
Predictions	Characteristic computed parameters of the FPLN (e.g. speed, altitude, time, fuel on board, …) based on current and entered atmospheric conditions (e.g. wind, temperature models, tropopause).
Pseudo waypoint	FPLN Items which indicate a particularity of the vertical profile of the flight plan. Examples: - Top of Climb (T/C) - Top of Descent (T/D) - Step Climb start point (S/C) - Step Descent start point (S/D) - Speed Limit (SPD LIM) - Deceleration point (DECEL) - Time Marker (UTC HHMM)
R	
Receiving ATS Unit (R-ATSU)	The ATS unit that will next assume control responsibility of a flight.
Receiving sector	Within a given ATSU, the next sector that the aircraft will enter.
Required Communication Performance (RCP)	Required Communication Performance is a statement of the performance requirements for operational communication in support of specific ATS functions.
RCP Type	A label (e.g., RCP240) that represents the values assigned to RCP parameters for communication transaction time, continuity, availability and integrity.
Required Communication Technical Performance (RCTP)	Required Communication Technical Performance is the set of performance requirements bearing on the technical communication ATM/CNS elements.
Responder	A human and/or machine party that is the target of a transaction and is required to provide an operational response.
RTA accuracy	RTA accuracy is the targeted maximum discrepancy between RTA value and a/c actual crossing time on RTA waypoint, associated with the RTA reliability figure.
RTA reliability	RTA reliability is the probability (in %) that the a/c will actually sequence RTA waypoint with the required accuracy (assuming the RTA has been set within the reliable ETAmin/ETAmax window).

Term	Definition
Reliable ETAmin/max	ETAmin (respectively ETAmax) is the earliest (respectively latest) ETA at a waypoint, provided the aircraft flies the 4D trajectory at its maximum (respectively minimum) allowable speed. Wind/temperature error is also taken into account in the ETAmin/max computation. ETAmin/max are computed on FMS side in order to guarantee that any RTA defined within associated ETAmin/max interval will be satisfied with reliability on a 95% probability basis.
S	
Safety Objective	The safety objective defines the maximum frequency or probability at which an Operational Hazard can be tolerated to occur.
Safety Requirement	A safety requirement is a requirement which is imposed on the system to meet the safety objective. Safety requirements may take various forms, including organizational, operational, procedural, functional, performance, and interoperability requirements or environmental characteristics.
Safety Target	The safety target is maximum frequency or probability at which an Operational Effect for a given Severity Class can be tolerated to occur.
Speed Schedule	The calculated or manually entered speeds the FMS is scheduled to use for the climb, cruise and descent when considering schedule requirements, ATC clearance, fuel, and operating costs. Speed schedule includes: Initial cruise speed (at top of climb (TOC); Last cruise speed (at top of descent (TOD); Descent speed.
Supplemental Means of Communication	Communication capability that is not required for the intended operation, but if available can be used instead of the normal means in accordance with operational approval.
Synchronised Trajectory	The result of a data exchange between air and ground systems where the trajectory of the aircraft is consistent with the trajectory of the ground system. The synchronised trajectory includes both portions that are cleared as well as portions not cleared or beyond any clearance limit imposed by ATC.
T	
TiBO	Step 1 of the SESAR storyboard. The goal of Time Based Operations is a synchronised and predictable European ATM system, where partners are aware of the business and operational situations and collaborate to optimise the network. The first step initiates arrival airport time prioritisation together with wide use of data-link and deployment of initial trajectory based operation through the use of a controlled time of arrival to sequence traffic and managed queues.
TraBO	Step 2 of the SESAR storyboard. The goal is a trajectory based ATM system where partners optimise "business and mission trajectories" through common 4D trajectory information and users define priorities in the network. TraBO initiates 4D based business/mission trajectory management using system wide information management and air-ground trajectory exchange to enable tactical planning and conflict free route segments.
Transferring ATS Unit (T-ATSU)	The ATS unit that is transferring control responsibility of a flight.
Transferring sector	Within ATS unit, the sector that is transferring control responsibility of a flight.
Transfer instruction	Voice or data link instruction to change frequency (immediate or deferred)
V	

Term	Definition
Vertical Type	Indicates the type of waypoint in the FMS vertical profile, amongst the following values: • Top of climb *(where climb stops and cruise FL is reached)* • Top of descent *(where cruise FL is left and descent starts)* • Start of step climb *(where climb starts to reach a new cruise FL)* • End of step climb *(where climb stops and new cruise FL is reached)* • Start of step descent *(where descent starts to reach a new cruise FL)* • End of step descent *(where descent stops and a new cruise FL is reached)* • Start of cruise climb segment *(where a cruise climb segment starts)* • End of cruise climb segment *(where a cruise climb segment ends)* • Level off *(level step when in climb or descent)* • Start of descent *(where descent is resumed after level off)* • Start of climb *(where climb is resumed after level off)* • Constant Mach segment • Cross over altitude *(where the aircraft transitions between constant IAS and constant Mach)* • Transition altitude *(where the aircraft transitions between QNH and Standard altimeter settings)* • Speed change *(where a speed change of more than 10 knots IAS or 0.10 Mach is planned to be initiated)* • Speed limit *(where a speed restriction for speed limit is to be applied)*
W	
Waypoint	A predetermined geographical position used for route definition and/or progress reporting purposes.
"What-if" function	A ground system function that provides the controller with capability to ☐nalyse the impacts of a trajectory change proposal, prior to issuing clearance.

1

2 ## 1.9 Acronyms and Terminology

Term	Definition
4D	Four Dimensional
4DTRAD	4D Trajectory Data Link
AAL	Above Aerodrome Level
A/C	Aircraft
A/G	Air-Ground
ACARS	Aircraft Communications Addressing and Reporting System
ACK	Acknowledgement
ACL	ATC Clearance (service)

Term	Definition
ACM	ATC Communication Management (service)
ACSP	Air-Ground Communication Service Provider
ADD	Architecture Definition Document
ADS/IC	Automatic Dependent Surveillance – Integrity Check
ADS-C	Automatic Dependent Surveillance – Contract
AFM	Aircraft Flight Manual
AGDL	Air-Ground Data Link
AIB	Airport Information Bulletin
AIP	Aeronautical Information Publication
AMC	ATC Microphone Check (service)
AMIC	Application Message Integrity Checked
AOBT	Actual Off Block Time
AOC	Airline Operation Center
AOR	Area of Responsibility
ASOR	Allocation of Safety Objectives and Requirements
ARINC	Aeronautical Radio Inc.
ATC	Air Traffic Control
ATFCM	Air Traffic Flow and Capacity Management
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
ATN / IPS	Aeronautical Telecommunication Network / Internet Protocol Suite
ATN ES	ATN End System
ATS	Air Traffic Services
ATSA	Air Traffic Services Assistant
ATSP	Air Traffic Service Provider
ATSU	Air Traffic Service Unit

Term	Definition
ASAS	Airborne Separation Assurance (ou Assistance) System
C-ATSU	Current Air Traffic Services Unit
CDA	Current Data Authority, Continuous Descent Approach
CM	Context Management
CMS	Contact Monitor Surveillance
CNS/ATM	Communication, Navigation, and Surveillance/Air Traffic Management
COP	Coordination Point
CPDLC	Controller Pilot Data Link Communication
CTA	Controller Time Arrival
CTO	Controlled Time Over
D-ATIS	Data link Automatic Terminal Information Service
D-ATSU	Downstream ATSU
DM	Downlink Messages
D-OTIS	Data link Operational Terminal Information Service
D-TAXI	Data link Taxi Service
DLIC	Data Link Initiation Capability
DM	Downlink Message
DOD	Detailed Operational Description
E-ATMS	European Air Traffic Management System
ENR	En-route
EOBT	Estimated Off Block Time
EPP	Extended Projected Profile
ES	End System
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
FIB	In-Flight Information Bulletin
FIS	Flight Information Service

Term	Definition
FL	Flight Level
FMS	Flight Management System
FOM	Figure Of Merit
FPL	Flight Plan (as filed and received by the ground system)
HMI	Human Machine Interface
IAF	Initial Approach Fix
IATA	International Air Transport Association
IBP	Industrial Based Platform
ICAO	International Civil Aviation Organization
INTEROP	Interoperability Requirement Standard
IOP	Interoperability-Air (referring to the local MUAC i4D umbrella project)
ITP	In Trail Procedure
IPS	Internet Protocol Suite
IRA5	International Reference Alphabet 5 (or IA5)
IRS	Interface Requirements Specification
INTEROP	Interoperability Requirements
LACK	Logical Acknowledgement
LOF	Logon Forward Message
LOA	Letter of Agreement
METAR	Aviation Routine Weather Report Service
MONA	ATC Monitoring Aids
MSSR	Monopulse Secondary Surveillance Radar
MTCD	Medium Term Conflict Detection
NA	Not Applicable
NDA	Next Data Authority
NOTAM	Notice to Airmen
OH	Operational Hazard

Term	Definition
OHA	Operational Hazard Assessment
OLDI	On-line Data Interchange
OPA	Operational Performance Assessment
OR	Operational Requirement
OSA	Operational Safety Assessment
OSD	Operational Service Description
OSED	Operational Service and Environment Definition
OTIS	Operational Terminal Information Service
PANS	Procedures for Air Navigation Services
PIAC	Peak Instantaneous Aircraft Count
PIB	Pre-Flight Information Bulletin
PIREP	Pilot Report
PSR	Primary Surveillance Radar
R-ATSU	Receiving Air Traffic Service Unit
RBT	Reference Business Trajectory
RCP	Required Communication Performance
RCTP	Required Communication Technical Performance
RNAV	Area Navigation
R-Sector	Receiving Sector
RTA	Required Time of Arrival
RVR	Runway Visual range
SESAR	Single European Sky ATM Research Programme
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.
SID	Standard Instrument Departure

Term	Definition
SIGMET	Significant Meteorological Forecast
SMM	System Management Message
SNOWTAM	Snow Warning to Airmen
SO	Safety Objective
SPECI	Aerodrome/Aviation Special Meteorological Report
SPR	Safety and Performance Requirements
SR	Safety Requirement
SSR	Secondary Surveillance Radar
ST	Safety Target
STAR	Standard Arrival Route
STCA	Short Term Conflict Alert
T-ATSU	Transferring Air Traffic Service Unit
TAD	Technical Architecture Description
TAF	Terminal Aerodrome Forecasts
T/D	Touchdown
TMA	Terminal Control Area
TOD	Top of Descent
TRA	Temporary Restricted Area
TS	Technical Specification
TSA	Temporary Segregated Area
T-Sector	Transferring sector
UM	Uplink Message
VCI	Voice Contact Instruction
VHF	Very High Frequency
WILCO	Will Comply
WMO	World Meteorological Organization

1

2 General Functional block Description

2.1 Context

Two-phased approach is proposed to properly manage the synchronisation with the operational and technical work-packages.

The first phase will synthesise and consolidate the operational and technical results of the previous and on-going programs and standardisation activities (i.e. Link 2000+, CASCADE, WG-78/SC-214) to set up a first set of technical requirements to be implemented and verified on the AGDL Air Server prototypes.

This first 2-year-phase can be qualified as a "bottom-up build-up" phase, split into a Phase 1a and 1b, as it intends to provide:

- ✈ Enhanced SESAR Data Link Services specification and development as per "pre-standard" (Interim Draft Standard) being developed by the WG-78/SC-214 international standardisation body (that "by construction" supports both SESAR and the U.S. Nextgen Programmes)

- ✈ Support to the "Initial 4D" Datalink Services that will be developed as part of SWP9.1 as well as an initial D-TAXI (SWP 9.13), and some of the SWP 9.33 D/L Services (e.g. DCL over ATN)

- ✈ Analyse the technical feasibility of the ICAO arising concept of ATN over IPS (IP Suite) that may be envisaged as a replacement of the ATN/OSI, as well as a potential and common IP Stack technology that could support the Air-Ground data exchanges via SWIM (it could be covered by P14.2.1).

- ✈ Phase 1b will only allow minor updates at the ground side, since the airborne platform will not plan any upgrade within Phase 1.

The second phase will consist in providing the operational projects with the phase 1 results (prototypes) for refinement and alignment with operational needs. By the end of phase 1 the SESAR operational and technical requirements that will impact the Enhanced Data Link Services specifications, will have matured and will be ready to be further integrated on top of the phase 1 prototypes.

The second phase can be qualified as an iterative "top-down refinement" phase as it intends to provide:

- ✈ A realignment of the Air Server Data Link Services with the maturing SESAR concept and architecture closely coordinated with the emerging "green cover" Enhanced Data Link standard. 10.07.01 together with 9.1/9.33 that need to freeze the Phase 2 baseline.

- ✈ Support the consolidation (upgrade and maintenance) of the phase 1 Enhanced Datalink Services

- ✈ Phase 2 will also need to follow the update of the WG-78/SC-214 standard, which will be implemented by SWP9.1/ SWP 9.33 as well.

2.2 Functional block Modes and States

N/A

2.3 Major Functional block Capabilities

The air-ground datalink communications/services functional blocks evolutions (and associated prototypes) anticipated in the frame of this 10.07.01 project, as well as the foreseen impact on related air-ground datalink communication services are the following:

- • Evolution of existing basic datalink services (e.g. Addition of new message in existing datalink message sets; Individual datalink message data fields; Change in the ordered sequence of

1 datalink messages for a given datalink service): i.e. DLIC service based on the AFN and CM
2 applications; ACM, ACL (including AGDL support to the ASAS ATSA-ITP applications), AMC
3 and DCL services based on enhanced CPDLC application;

4 • Creation of new enhanced datalink services aiming at supporting the SESAR 4D trajectory
5 based concept in the course of the IP2 time frame: i.e. D-TAXI, DCL, 4DTRAD and Trajectory
6 Negotiation services based on enhanced CPDLC and ADS-C applications; ADS-C application
7 enhancement to support Ground TP enhancement;

8 • Validation and Verification of Interoperability of future ATM-systems basing on datalink
9 operations, will be targeted by the project. The industrial partners with their three major ATM-
10 system baselines and the ANSP-partners, currently operating these three baseline ATM.-
11 systems, provide unique possibilities for crosscheck of interoperability issues in a unique
12 environment.

13 An important expected outcome from this project is the prototyping and verification of those datalink
14 services required to support "Initial 4D" operations (i.e. datalink services and application to support
15 the i4D avionics package being developed in the frame of P9.1). However, i4D is not the only air-
16 ground datalink based concept element targeted by this project (e.g. other datalink service like D-
17 TAXI, is also intended to be addressed).

18 ## 2.4 User Characteristics

19 Table 1 shows the external and internal Stakeholders concerned by the technical Specification
20 regarding Performance, Safety and Interop requirements, as well as the Validation objectives to prove
21 to Stakeholders that the system requirements are is fit for purpose.

22

Stakeholder	External / Internal to the Project	Involvement	Performance expectations	Validation objectives
Airline	External	End User	Capability to exchange more Airline Operation information and preferences.	Interoperability with Airline systems.
Airline	External	End User	Improvement of situation awareness for pilots.	Validate capability to support AGDL exchanges. Show safety improvements.
Airport Operator	External	End User	Capability to exchange more Airport Operation information and clearances.	Validate capability to support AGDL exchanges.
ATC Service Provider	Internal	End User	Reduction of the number of runway incursions.	Validate capability to support AGDL exchanges. Show safety improvements.
ATC Service Provider	Internal	End User	Reduction of voice VHF frequency load and controllers workload.	Validate performance quality of service and safety of the system.

ATC Service Provider	Internal	End User	Enhance the safety and the quality of the information to be exchange.	Validate performance quality of service and safety of the system.
ATC Service Provider	Internal	End User	Initial capability to exchange 4D trajectory enhancing the ATC Tools performances and accuracy.	Validate performance quality of service and safety of the system.
Aircraft	External	End User	Capability to notify pilot preferences and receive cleared routes.	Validate performance quality of service and safety of the system.
Aircraft	External	End User	Initial capability to exchange 4D trajectory.	Validate performance quality of service and safety of the system.
EUROCAE WG-78/RTCA SC-214	External	Standardisation	Constant information exchanges with Standardization groups. Provide pre-standard verification activities.	Validate the standard verification initiatives.
ICAO/OPLINK Panel	External	Global Interoperability Standardization	Constant information exchanges with ICAO groups.	Check validation baseline against ICAO development

Table 3: Stakeholders Concerned by the Specification

2.5 Operational Scenarios

2.5.1 i4D Scenarios

i4D Concept Description

Flight plans are modified for many reasons; incorrect entries, local routings that are unknown to aircrew, change messages being delayed or not treated, so following the filling of a flight plan until the pilot actually talks to a controller there is no assurance that changes to that flight plan have been transmitted to both sides. Even then, unless there is a degree of suspicion either on the ground or in the air there is still no standard way of confirming the "sameness" beyond "best practise". Therefore the first step of the i4D concept is aimed at the synchronisation of airborne held and ground held trajectories for the same flight in order to allow a more accurate and efficient planning and sequencing of flights.

Once the flight plan has been agreed i4D will support operations that require flights to meet time constraints at various points of their progression.

Step 1

The i4D service starts with the downlink of the aircraft 4D trajectory.

Before entering the area serving i4D traffic the flight will downlink via ADS-C the FMS held trajectory, the downlink will be via the Extended Projected Profile (EPP) and is available via the Periodic or Event contract as set up during the aircrafts log-on process. This 4D profile is based on the ICAO FPL but takes into account additional operational information related to the business purpose of the flight

and environment conditions (e.g. load, cost index, meteorological information for the planned route, etc.).

Based on all these inputs the FMS computed trajectory is already different than the one communicated to ATC in the FPL.

In addition the ground systems process the received FPLs taking into account information that is not always available at the time when the FPL was submitted (e.g. tactical deactivation of restricted areas, changes in hand over conditions between ATSUs, sectors configuration adaptations to meet the tactical traffic demand, optimisation of flows for tactical de-confliction of traffic, etc.).

Step 2

The second step in the i4D concept cross checks the received FMS trajectory against the ground version for consistency and conformance. Should the 2D later path be different between the two systems the controller is warned - making the two plans consistent becomes a priority to avoid unexpected turns by the aircraft.

The centre applies its vertical constraints that are local to the centre in order to off load busy sector or optimise descent profiles for efficient ATC handling or part of the bi-party Letters of Agreement.

Step 3

The third step of the service consists in a negotiation of the 3D trajectory between ground and air. At this stage the ground agreed trajectory will be uplinked to the aircraft. The flight crew will analyse (by the means of a flight plan trial function) the implications of the ground proposed trajectory and will either accept or reject it. In case of a rejection the i4D service must continue to be negotiated and the trajectory discrepancies will be solved between air and ground using voice communications and tactical control instructions.

It is anticipated that in most cases trajectory changes proposed by the ground systems will be minor and acceptable to the flight crew.

Step 4

Once the 3D flight plan has been acknowledged and received via an updated EPP a requested is made via ADS-C for the estimated minimum and maximum ETAs at a particular waypoint in order to calculate a possible time constraint.

Starting from the estimated times downlinked by the aircraft the ground system will calculate a time constraint for the waypoint. The time constraint may be sourced from a range of tools (e.g. AMAN, complexity manager, ETFMS, etc.) and might have various operational purposes (e.g. sequencing at the arrival aerodrome, sequencing in en-route for reduction of traffic complexity, etc.). For arriving at complex TMAs, the constraint waypoint may be an en-route waypoint shortly before or at the top of descent, a waypoint that serves as a gate for merging and sequencing or the point at which the aircraft begins its instrument approach procedure (i.e. IAF or FAF) or at the destination. The constraint waypoint is expected to be determined and used by the AMAN tool. The position of the constraint waypoint will depend on the configuration of the tool and also on the configuration and complexity of the TMA sector concerned.

The constraint waypoint can also be in some cases an en-route waypoint and be used by the en-route conflict detection tools (Medium Term Conflict Detection – MTCD or Complexity Management Tools).

As for the planned timescale the avionics will not be able to support multiple time constraints at the same time it is anticipated that the ground component of the 4DTRAD service will need to propose one constraint that has the maximum benefit from a network perspective.

Note: If a flight does not need to be constrained it is obvious that the service application will stop at this point and that the flight will continue unrestricted. In these circumstances the benefit of i4D will be that the air and the ground have the same view on the progression of the flight so the workload associated to discrepancies is eliminated.

Step 5

At this stage the ground system negotiates the time constraint with the aircraft. Because the time constraint derivation is based on the aircraft estimated times it is anticipated that in most cases the

1 time constraint will be accepted by the flight crew. In case the time constraint can not be accepted the
2 ground will try to negotiate another time constraint or the service will be terminated.

3 *Note: Depending on the length of time to calculate the constraint and the time for the uplink to occur*
4 *the ETAmin/max may no longer be valid.*

5 Step 6

6 The flight continues its progression in accordance with the agreed 4D trajectory. ATC will uplink
7 clearances for its Area of Responsibility in accordance with the agreed 4D trajectory and try to the
8 possible to limit tactical interventions. In some cases (for separation assurance or due to weather) the
9 aircraft trajectory will need to be modified in comparison to the plan. In this case, if the aircraft can still
10 meet the time constraint i4D is continued seamlessly. In case the tactical intervention results in the
11 aircraft not being able to meet the time constraint a warning will be presented both to the flight crew
12 and the controller, a new 4D trajectory is downlinked and a new negotiation of a time constraint might
13 be required.

14 Although vertical constraints have been negotiated in the agreed 3D trajectory, it is expected that the
15 uplinked clearances will allow for inclusion of vertical constraints as per today. The altitude changes
16 will be initiated by the flight crew in accordance with the agreed trajectory for operational and flight
17 efficiency purposes, and by the ground for separation assurance purposes.

18 Step 7

19 At this stage the aircraft reaches the waypoint for which a time constraint was agreed. This results
20 either in the termination of the service, or in a new process aimed at setting a new time constraint in
21 case it is required.

22 The diagram below illustrates the air-ground exchanges for i4D.

23
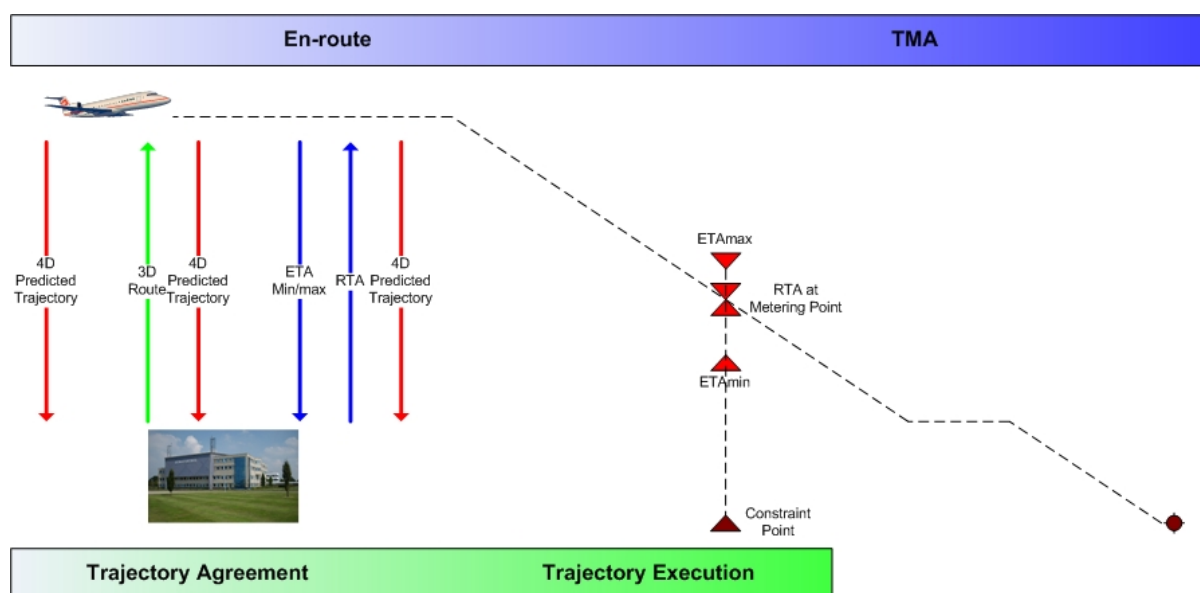
24 **Figure 5: Air-ground exchanges for i4D**

2.5.2 D-TAXI Scenario

26 The functions of an aerodrome control tower may be performed by different control or working
27 positions, such as:

28 ✈ Aerodrome controller, normally responsible for operations on the runway and aircraft flying within
29 the area of responsibility of the aerodrome control tower;

30 ✈ Ground controller, normally responsible for traffic on the manoeuvring area with the exception of
31 runways;

32 ✈ Clearance delivery position, normally responsible for delivery of start-up and ATC clearances to
33 departing IFR flights.

2.5.2.1 Control of Aerodrome Traffic

The following positions of aircraft in the traffic and taxi circuits are the positions where the aircraft normally receives aerodrome control tower clearances. The aircraft should be watched closely as they approach these positions so that proper clearances may be issued without delay. Where practicable, all clearances should be issued without waiting for the aircraft to initiate the call.

→ *Position 1*. Aircraft initiates call to push-back (if parked at a gate), start up, and taxi for departing flight. Runway-in-use information and push-back, start up, and taxi clearances are given

→ *Position 2*. If there is conflicting traffic, the departing aircraft will be held at this position. Engine run-up will, when required, normally be performed here.

→ *Position 3*. Take-off clearance is issued here, if not practicable at position 2.

→ *Position 4*. Clearance to land is issued here as practicable.

→ *Position 5*. The expected taxi routing to apron is issued here.

→ *Position 6*. Parking information is issued here, if necessary.
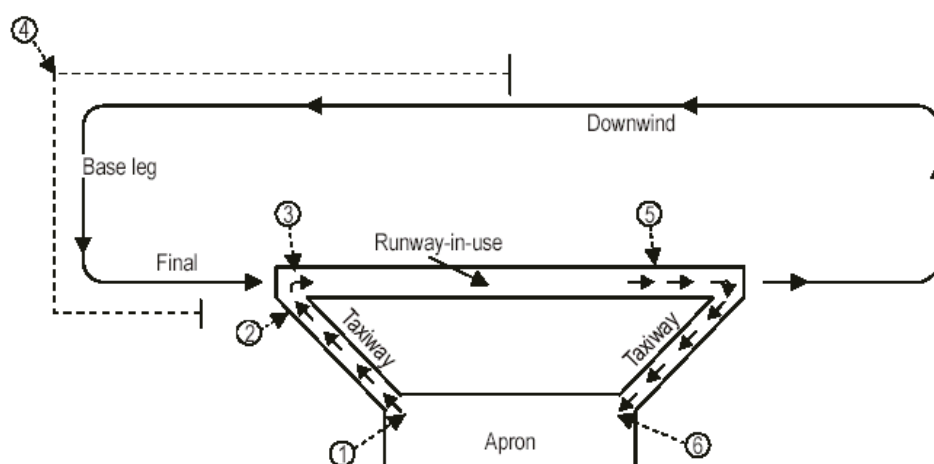
Figure 6: Positions of aircraft in the traffic and taxi circuits

Note: The EXPECT message is supposed to be sent during pre-flight phase (position 1) while the aircraft is on the apron for the departing procedures and before the final approach phase (position 5) for the arriving procedures. This assumption will be validated with WP 6.7.2.

PUSH-BACK AND START UP CLEARANCE

When parked at a gate, the pilots shall ask for a push-back clearance, which might be combined simultaneously with the start-up clearance request.

Expect message is supposed to be receive in this phase (to be confirmed with 6.7.2).

TAXI CLEARANCE

Prior to issuing a taxi clearance, the controller shall determine where the aircraft concerned is parked. Taxi clearances shall contain concise instructions and adequate information so as to assist the flight crew to follow the correct taxi routes, to avoid collision with other aircraft or obstacles and to minimize the potential for the aircraft inadvertently entering an active runway.

When a taxi clearance contains a taxi limit beyond a runway, it shall contain an explicit clearance to cross or an instruction to hold short of that runway [Doc4444].

The graphical taxi route of a taxi clearance must help the pilot to visualize the route to follow and the holding points at which to stop.

1 **TAXIING ON A RUNWAY-IN-USE**

2 For the purpose of expediting air traffic, aircraft may be permitted to taxi on the runway-in-use,
3 provided no delay or risk to other aircraft will result. Where control of taxiing aircraft is provided by a
4 ground controller and the control of runway operations by an aerodrome controller, the use of a
5 runway by taxiing aircraft shall be coordinated with and approved by the aerodrome controller.
6 Communication with the aircraft concerned should be transferred from the ground controller to the
7 aerodrome controller prior to the aircraft entering the runway.

8 If the control tower is unable to determine, either visually or by radar, that a vacating or crossing
9 aircraft has cleared the runway, the aircraft shall be requested to report when it has vacated the
10 runway. The report shall be made when the aircraft is away from the runway [Doc4444].

11 **USE OF RUNWAY-HOLDING POSITIONS**

12 Aircraft shall not be permitted to line up and hold on the approach end of a runway-in-use whenever
13 another aircraft is landing, until the landing aircraft has passed the point of intended holding.

14 Moreover, the holding position depends on the current approach category for the runway (CAT I,
15 CATIII)

2.5.2.2 Control of Departing Aircraft

17 Departures shall normally be cleared in the order in which they are ready for take-off, except that
18 deviations may be made from this order of priority to facilitate the maximum number of departures
19 with the least average delay.

20 Take-off clearance may be issued to an aircraft when there is reasonable assurance that appropriate
21 separation will exist when the aircraft commences take-off.

22 The take-off clearance shall be issued when the aircraft is ready for take-off or approaching the
23 departure runway, and the traffic situation permits. To reduce the potential for misunderstanding, the
24 take-off clearance shall include the designator of the departure runway.

25 In the interest of expediting traffic, a clearance for immediate take-off may be issued to an aircraft
26 before it enters the runway. On acceptance of such clearance the aircraft shall taxi out to the runway
27 and take off in one continuous movement [Doc4444].

2.5.2.3 Control of Arriving Aircraft

29 A landing aircraft will not normally be permitted to cross the runway threshold on its final approach
30 until the preceding departing aircraft has crossed the end of the runway-in-use, or has started a turn,
31 or until all preceding landing aircraft are clear off the runway-in-use.

32 An aircraft may be cleared to land when there is reasonable assurance that appropriate separation
33 will exist when the aircraft crosses the runway threshold, provided that a clearance to land shall not
34 be issued until a preceding landing aircraft has crossed the runway threshold. To reduce the potential
35 for misunderstanding, the landing clearance shall include designator of the landing runway.

36 When necessary or desirable in order to expedite traffic, a landing aircraft may be requested to:

37 ✈ Hold short of an intersecting runway after landing;

38 ✈ Land beyond the touchdown zone of the runway;

39 ✈ Vacate the runway at a specified exit taxiway;

40 ✈ Expedite vacating the runway.

41 In requesting a landing aircraft to perform a specific landing and/or roll-out manoeuvre, the type of
42 aircraft, runway length, location of exit taxiways, reported braking action on runway and taxiway, and
43 prevailing weather conditions shall be considered. A HEAVY aircraft shall not be requested to land
44 beyond the touchdown zone of a runway.

45 If the pilot-in-command considers that he or she is unable to comply with the requested operation, the
46 controller shall be advised without delay.

When necessary or desirable, e.g. due to low visibility conditions, a landing or a taxiing aircraft may be instructed to report when a runway has been vacated. The report shall be made when the aircraft is well clear of the runway [Doc4444]. This report is also useful if the nominated exit hasn't been taken, it informs the controller of where the pilot has vacated the runway.

2.6 Functional

2.6.1 Functional decomposition

The ATS functions provide air traffic services supported by data communications Data link application(s) and their associated data link services support each of these ATS functions. Expansion of air traffic services is realized by allocating non-time critical ATC communications suitable for data link, leaving time critical ATC communications to voice. Proper integration of the data link system into the aircraft and controller's workstation will enable the flight crew and controller to maintain an acceptable level of workload with an increase in air traffic. Allocation of ATC communications in this manner improves efficiency of the ATC communication system as well as improving performance and reducing workload of air traffic controllers and the flight crew. A combined voice and data communication system is envisioned to provide a more strategic ATC service which will reduce delays, improve traffic flow and decrease controller workload; thus permitting a greater number of aircraft a controller can manage as well as improves the overall predictability of airline and airport operations

This section describes the ATS functions that are supported by the data link applications defined in this document. Air Traffic Services (ATS), as defined in ICAO Annex 11, consist of the Air Traffic Control (ATC) service, flight information service and alerting service. These services are provided by Air Traffic Service Units (ATSUs) performing specific ATS services. Communications, navigation, and surveillance on the ground and in the aircraft support these ATS services. The data link applications and services described in this document support the communication and surveillance element of the ATS functions described in this document. The five ATS functions described in this document are:

- ✓ Voice Communication Management (VCM), defined in section 2.6.2.1

- ✓ Route Planning (RP), defined in section 2.6.2.2

- ✓ Route Conformance Monitoring (RCM), defined in section 2.6.2.3

- ✓ Separation Assurance (SA), defined in section 2.6.2.4

- ✓ Flight Information (FI), defined in section 2.6.2.5
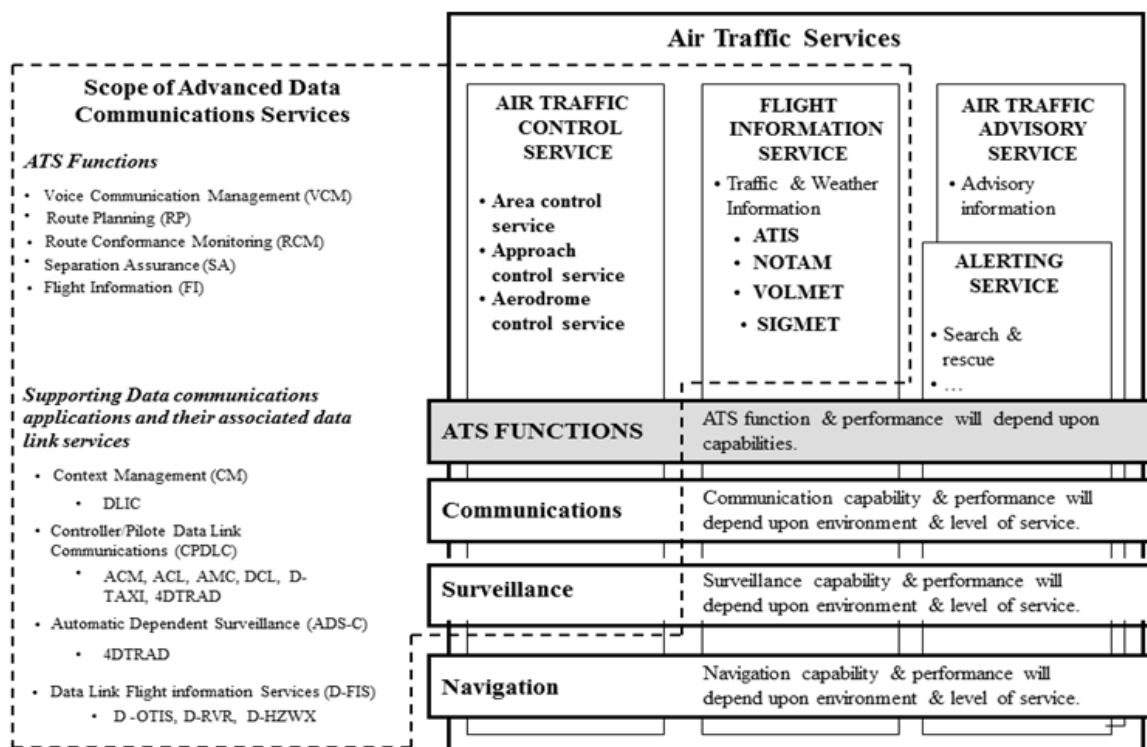
Figure 7: ATS Functions, Communication, Navigation and Surveillance Capabilities, and Data Communications Services

This figure was used to develop the P10.07.01 prototypes but is not completely in line with the one in the ATN B2 standard published by EUROCAE and RTCA (cf. Gap analysis in appendix)
In the context of this document, FIS application was not implemented.

2.6.2 Functional analysis

2.6.2.1 Voice Communication Management (VCM)

VCM uses a data communications link to assume responsibility for the accessibility of a voice communication link. These data messages are to:

✓ Facilitate transfer of voice communications and control between ATSUs;

✓ Provide a mechanism to alert aircraft of a stuck microphone which is impairing use of the voice channel.

✓ Ensure aircraft's voice communication system is tuned to the appropriate voice channel of the designated ATSU.

When VCM detects an aircraft's voice communication system is not tuned to the designated ATSU, the controller and flight crew is informed for corrective action.

VCM uses the data link services and their associated CM (DLIC service) and CPDLC (ACM and AMC services) applications.

2.6.2.2 Route Planning (RP)

Route Planning (RP) enables a pilot or controller to request a new or revised clearance. These data messages are used to:

✓ Provide the controller(s) and the flight crew the ability to negotiate a trajectory along the intended route (RBT) to allow the aircraft to navigate along the most efficient route keeping involved ATSU's fully updated.

✓ Provide the controller the ability to issue and flight crew the ability to request instructions and clearances to:

- Facilitate dynamic control and movement of aircraft through an airspace, e.g. routing aircraft thru specific vertical or lateral routing, weather deviations, and In-Trail Procedures (ITP).

- Facilitate efficiency in routing aircraft through an airspace, e.g. 4D-Trajectory Based Operations.

✓ Routine clearances will utilize data communication via CPDLC and time critical communications will revert to voice.

RP uses the data link services and their associated CM (DLIC service) and CPDLC (ACL, DCL, D-TAXI and 4DTRAD services) applications.

2.6.2.3 Route Conformance Monitoring (RCM)

Route Conformance Monitoring (RCM) monitors the aircraft's actual route information to ensure that the aircraft conforms to the current clearance. The position and intent information is monitored for conformance to the cleared profile. The position information includes a figure of merit (FOM) indicating position accuracy, which is monitored against the navigation performance requirement for the separation being applied. When RCM detects a discrepancy, the controller is informed and takes corrective action.

RCM uses the data link services and their associated CM (DLIC service) and ADS-C (4DTRAD service) applications.

2.6.2.4 Separation Assurance (SA)-strategic

Separation Assurance in a strategic sense (SAstrategic) enables a controller to provide clearances via CPDLC in non-time critical situations. These data messages are used to provide the controller the ability to issue routine profile changing messages (vertical, lateral) to maintain the minimum required separation.

SAstrategic uses the data link services and their associated CM (DLIC service) and CPDLC (ACM, ACL and 4DTRAD services) applications.

Separation Assurance in non-time critical context (SAstrategic) requires that specified navigation, communication, and surveillance requirements are met in accordance with the separation minima being applied. Prior to applying any separation minima, the ATSU verifies that the aircraft is properly capable. A capable aircraft comprises the following elements:

✓ presence of relevant serviceable equipment on board the aircraft;

✓ equipment and capabilities commensurate with flight crew qualifications; and

✓ where applicable, authorization from the appropriate authority.

The separation minima for continental airspace operations (i.e. airport, terminal, enroute) does not change with the introduction of data communications

2.6.2.5 Flight Information (FI)

Flight Information (FI) consists of aeronautical and meteorological information (e.g., NOTAM and weather) which assist the flight crew in provision of situational awareness during RP.

FI uses the data link services and their associated CM (DLIC service) and FIS (D-OTIS service) applications.

1 The Flight Information function was implemented and is no more part of ATN B2 standard.

2.7 Service View

3 N/A

3 Functional block Functional and non-Functional Requirements

3.1 Capabilities

In this document, the requirements are let organized in the same subsections than in the previous version of this TS, this is why subsections 3.2,...3.9 are not applicable. The reason is that the requirement's identifiers are linked to the section where they are, and we should change the identifiers because of the traceability with the verification plan.

3.1.1 Context Management (CM) Application

The Context Management (CM) application provides the Data Link Initiation Capability (DLIC) data link service.

3.1.1.1 Data Link Initiation Capability (DLIC) data link service Requirements

The DLIC service exchanges information between an aircraft and an ATSU to identify the data link services that are supported.

The DLIC service is also used to establish a unique identity address for each aircraft initiating the connection process.

The DLIC service provides version and address information for all data link services including itself.

The DLIC service is executed prior to any other addressed data link service.

DLIC information must be available for each ATSU that will offer addressed data link services. This can be accomplished by initiating the DLIC function between each ATSU and the aircraft. However, the DLIC initiation function may need to be completed only once for a given flight. In this case, the ATSU with which the initiation function was conducted must either:

- ✓ Allow other ATSUs to access the DLIC initiation information (e.g. DLIC server); or,
- ✓ Provide aircraft DLIC initiation information to a subsequent ATSU, and each subsequent ATSU again passes the DLIC initiation information to its subsequent ATSU.
- ✓ The DLIC service exchanges information between an aircraft and an ATSU to identify the data link services that are supported.

[REQ]

Identifier	REQ-10.07.01-TS-3111.001
Requirement	SESAR 10.07.01 project targets **shall** comply with operational, safety, performance and interoperability requirements defined by WG78/SC214 (Advanced ATS Data Communication SPR & Interop) version H (Feb 2010) for the development and the validation of the DLIC service, as part of the CM application. Also the agreed PDRs list included in Appendix B is applied.
Title	Project Targets for DLIC service
Status	<Validated>
Rationale	*Note 1: in case of discrepancies between the Interop and the SPR the Interop prevails*.
Category	<Functional>

Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0300	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F040-0060	<Partial>

3.1.2 Controller Pilot Data Link Communication (CPDLC) Application

The Controller-Pilot Data Link Communication (CPDLC) application provides the following services: ATC Communications Management (ACM), ATC clearance (ACL), ATC Microphone Check (AMC), Departure Clearance (DCL), Data Link Taxi (D-TAXI) and 4D Trajectory Data link (4DTRAD) services.

The REQ-10.07.01-TS-0312.001 requirement is removed from the previous list of requirements, as considered as not relevant, but the text is kept as a reminder:

> *SESAR 10.07.01 project will not implement a prototype product providing both FANS 1/A+ (ED100A/DO258A compliant ATS Datalink applications) and WG78/SC214 Advanced ATS Datalink applications.*

> *Note1: Only WG78/SC214 Advanced ATS Datalink applications, over ATN, are considered eligible for SESAR validation effort.*

3.1.2.1 ATC Communications Management (ACM) data link service Requirements

ACM is an Air Traffic Service using the CPDLC application, which provides automated assistance to the flight crew and current and next controllers for conducting the transfer of ATC communications. The ACM service encompasses the transfer of voice communication and the transfer of CPDLC authority.

The ACM service is intended to be used in all phases of flight and surface operations.

Note: For safety reasons, the use of ACM may be restricted during specific critical phases of flight (e.g., take-off and landing).

ACM may be used:

- ✓ to initially establish CPDLC with an ATSU,
- ✓ to manage data communications from the T-sector/T-ATSU to the R-sector/R-ATSU,
- ✓ to terminate data communications with an ATSU, and
- ✓ to manage a change of voice frequency.

When the ACM service is used for transfers or a change of voice frequency, it is initiated by:

- ✓ the transferring sector/ATSU, or
- ✓ a request from the receiving sector/ATSU, or
- ✓ a request from the flight crew.

1 The ACM service is completed prior to using any other CPDLC service

2 **Silent transfer** (actually solution proposed by an evolution of the existing communication definition for
3 which the full operational service is under definition and validation) is an additional operational
4 functionality added in ACM. Silent transfer is intended to minimise (or not use) the voice link use for
5 the transfer operation during which control responsibility is transferred and voice frequency is
6 changed to the next controlling sector.

7 As voice is a primary link in the operating environment, a key point is to ensure that the voice link is
8 operating and available after the frequency change has been performed. Safety issues are raised by
9 Crew & by Approval authorities as the voice link is never exercised until needed (noting that the voice
10 link is a safety critical link, used for tactical instructions).

11 Hence additional CPDLC application messages transactions have been added to support silent
12 transfer operations of a VCI (Voice Change Instruction).

13 The controller (or ground ATSU) can verify the aircrew selected the correct frequency during the
14 transfer of communications by sending a frequency confirmation message (UM288 VERIFY
15 MONITORED FREQUENCY [frequency] or UM117 CONTACT [unitname] [frequency]).

16 [REQ]

Identifier	REQ-10.07.01-TS-3121.001
Requirement	SESAR 10.07.01 project targets **shall** be in compliance with operational, safety, performance and interoperability requirements defined by WG78/SC214 (Advanced ATS Data Communication SPR & Interop) for the development and the validation of the ACM service, as part of the CPDLC application. Also the agreed PDRs list included in Appendix B is applied.
Title	Project Targets for ACM service
Status	<Validated>
Rationale	*Note: The essential item related to "silent transfer" is last step of the operating methods / datalink transactions where the changed Voice frequency has to be Monitored / Confirmed*
Category	<Functional>
Validation Method	
Verification Method	<Test>

17
18 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F040-0060	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0300	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F040-0070	<Partial>

19
20 [REQ]

Identifier	REQ-10.07.01-TS-3121.002
Requirement	SESAR 10.07.01 project targets **shall** be in compliance with operational, safety, performance and interoperability requirements (CPDLC Timing requirements and recommendations for TMA area defined by WG78/SC214 (Advanced ATS Data Communication SPR & Interop) for the development and the validation of the ACM service **in approach**, as part of the CPDLC application.
Title	Project Targets for ACM service in approach
Status	<Validated>
Rationale	*Note-1: The performance concept for CPDLC and other ATS Datalink communication proposes to define different Required Communication*

	Performances that can be used by the ground system according to the operational context and the message type used in the CPDLC and other ATS Datalink communication transaction.
Category	<Functional>
Validation Method	
Verification Method	<Test>

1

2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0300	<Partial>

3

4 3.1.2.2 ATC Clearances (ACL) data link service Requirements

5 The ACL service supports operational ATC data communication between the flight crew and the
6 ground system/controller of the Current Data Authority ATSU (C-ATSU).

7

8 ACL provides CPDLC messages (as described in SPR-H-Part3-CPDLC-Feb3 [1], Section 5.2) for the
9 following:

10 ✈ clearance:

11 ✓ delivery,

12 ✓ request, and

13 ✓ response;

14 ✈ level/identity monitoring;

15 ✈ monitoring of current/planned position;

16 ✈ advisories:

17 ✓ request, and

18 ✓ delivery;

19 ✈ system management functions; and

20 Emergency situations.

21 ACL messages are based on ATC voice phraseology. The C-ATSU system/controller is provided with
22 the capability to compose and send ACL messages to a flight crew. The flight crew is provided with
23 similar capabilities.

24

25 The ACL service is expected to be used for routine or frequent types of transactions.

26

27 ACL is expected to be used for communication functions in which the use of voice communication is
28 considered inefficient or unnecessary, thereby reducing voice-channel use and, where resulting
29 controller workload reduction allows increases in sector size, reduction in the number of required
30 voice channels.

31

32 ACL does not affect the principle that there is only one controlling authority for a given aircraft at a
33 given time.

34

35 The ACL service is intended to be used in all phases of flight.

36

1 Note: For safety reasons, the use of ACL may be restricted during specific critical phases of flight, (e.g., take-off
2 and landing).

3 [REQ]

Identifier	REQ-10.07.01-TS-3122.001
Requirement	SESAR 10.07.01 project targets **shall** be in compliance with operational, safety, performance and interoperability requirements defined by WG78/SC214 (Advanced ATS Data Communication SPR & Interop) for the development and the validation of the ACL service, as part of the CPDLC application. Also the agreed PDRs list included in Appendix B is applied.
Title	Project Targets for ACL service
Status	<Validated>
Rationale	*Note 1: The definition and prototyping of CPDLC message set defined by SC214/WG78 (e. g. mainly defined for the En-Route phase) will be considered. Need for new CPDLC messages dedicated to the Approach phase will be assessed. Should the need for specific messages be identified, definition and prototyping would be achieved by the use of FreeText message elements. This can be seen as a potential deviation from SC214/WG78 operational requirements*
Category	<Functional>
Validation Method	
Verification Method	<Test>

4
5 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>

6
7 [REQ]

Identifier	REQ-10.07.01-TS-3122.002
Requirement	SESAR 10.07.01 project targets **shall** be in compliance with operational, safety, performance and interoperability requirements (CPDLC Timing requirements and recommendations for TMA area defined by WG78/SC214 (Advanced ATS Data Communication SPR & Interop) for the development and the validation of the ACL service **in approach**, as part of the CPDLC application.
Title	Project Targets for ACL service in approach
Status	<Validated>
Rationale	*Note-1: The performance concept for CPDLC and other ATS Datalink communication proposes to define different Required Communication Performances that can be used by the ground system according to the operational context and the message type used in the CPDLC and other ATS Datalink communication transaction.*
Category	<Functional>
Validation Method	
Verification Method	<Test>

8
9 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0310	<Partial>

1
2 [REQ]

Identifier	REQ-10.07.01-TS-3122.003
Requirement	SESAR 10.07.01 project targets **shall** be in compliance with interoperability requirements (CPDLC for ITP message elements) defined by WG78/SC214 (Interoperability Requirements Standard For Advanced ATS Data Communication) for the development and the validation of the CPDLC messages for ATSA-ITP procedures.
Title	CPDLC messages for ATSA-ITP procedures
Status	<Validated>
Rationale	*Note-1:* As far as avionics is concerned, Interoperability Requirements Standard For Advanced ATS Data Communication only provides CPDLC for ITP over ATN. The objective is to prototype these message elements as part of a SC214/WG78 CPDLC application, which intends to be a convergent CPDLC application (i.e. that could be used in Oceanic and in Domestic airspaces).
Category	<Functional>
Validation Method	
Verification Method	<Test>

3
4 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>

5

3.1.2.3 ATC Microphone Check (AMC) data link service Requirements

7 The AMC service provides controllers with the capability to uplink an instruction to an aircraft in order
8 for the flight crew to check that the aircraft is not blocking a given voice channel.
9
10 The AMC service can be implemented in two ways:

11   1. as an addressed service and/or

12   2. as a broadcast service.

13 A given state may make the AMC service available as:

14   1. both addressed and broadcast,

15   2. addressed only, or

16   3. broadcast only.

17
18 Both addressed and broadcast AMC are initiated by the ATSU system or the by the controller. ACM is
19 a prerequisite for addressed AMC.
20
21 Both addressed and broadcast AMC consist of a single uplink message which is either individually
22 addressed to each applicable aircraft and/or broadcast to all aircraft in range.
23
24 Note 1: Some states have found that specifying the blocked frequency when instructing flight crew(s) to check
25 their microphone results in the flight crew tuning to the stuck frequency, and therefore do not provide the
26 frequency in the instruction.

27 Note 2: When using the addressed AMC, the interface to controller is a local issue that could allow the controller
28 to select some or all aircraft and the message is "multicast" by creating an addressed message to each indicated
29 aircraft.

30 The AMC service is available in all phases of flight.

Note: For safety reasons, the use of AMC may be restricted during specific critical phases of flight. (e.g., take-off and landing)

[REQ]

Identifier	REQ-10.07.01-TS-3123.001
Requirement	SESAR 10.07.01 project targets **shall** be in compliance with operational, safety, performance and interoperability requirements defined by WG78/SC214 (Advanced ATS Data Communication SPR & Interop) for the development and the validation of the AMC service, as part of the CPDLC application. Also the agreed PDRs list included in Appendix B is applied.
Title	Project Targets for AMC service
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>

3.1.2.4 Departure Clearance (DCL) data link service Requirements

The DCL service provides automated assistance for requesting and delivering departure or departure and startup combined clearances.

The DCL service is intended for use during the surface departure phase of operation.

DCL clearances are not provided once the aircraft leaves the holding point for the take-off runway.

DCL is an air traffic service supported by CPDLC, which provides support for the following exchanges:

- Aircrew departure clearance requests and responses to ground; and

- Controller delivery of departure clearance and revised departure clearances to aircraft.

- Aircrew Departure Clearance Confirmation

Note: *When deemed operationally relevant some ground systems may append additional message elements to the departure clearance (e.g., start-up or pushback clearance)*

[REQ]

Identifier	REQ-10.07.01-TS-3124.001
Requirement	SESAR 10.07.01 project targets **shall** comply with operational, safety, performance and interoperability requirements defined by WG78/SC214 (Advanced ATS Data Communication SPR & Interop) for the development and the validation of the DCL service, as part of the CPDLC application. Also the agreed PDRs list included in Appendix B is applied.
Title	Project targets for DCL service
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	

Verification Method	<Test>

1
2   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>		N/A
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-HMIC.0001	<Partial>

3
4   [REQ]

Identifier	REQ-10.07.01-TS-3124.002
Requirement	The management of DCL CPDLC service **shall** comply with messages as defined in table 5-30, column DCL, and in table 5-31, column DCL, in the "Data Communications Safety and Performance Requirements version H - Part 3 CPDLC" and further refined interoperability SESAR document 9.33 D2 ("Interface document between A/C and ground tools").
Title	CPDLC messages for DCL service
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

5
6   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-HMIC.0001	<Partial>

7
8   [REQ]

Identifier	REQ-10.07.01-TS-3124.003
Requirement	The DCL service **shall** provide the capability to the controller to send the departure clearance via the UM264 CPDLC message.
Title	Initial DCL message sending
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

9
10   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RPFM.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RPFA.0010	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

11
12   [REQ]

Identifier	REQ-10.07.01-TS-3124.004
Requirement	If a departure clearance has been already sent, it **shall** be possible to send a new departure clearance concatenating the UM325 CPDLC message (REVISED) with the UM264 CPDLC message ([departure clearance enhanced]).
Title	Revised DCL message sending
Status	<Validated>
Rationale	*Note. In a revised clearance message only the items that have changed are sent. If any portion of the route has changed then the entire route is resent.*

Category	<Functional>
Validation Method	
Verification Method	<Test>

2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RPFM.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RPFA.0010	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

4 [REQ]

Identifier	REQ-10.07.01-TS-3124.005
Requirement	The possible responses to an initial/revised DCL clearance message **shall** be one of the following: ✈ WILCO (DM0) ✈ UNABLE (DM1) ✈ STANDBY (DM2)
Title	DCL message responses reception
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

8 [REQ]

Identifier	REQ-10.07.01-TS-3124.006
Requirement	The DCL service **shall** make the received WILCO, STANDBY or UNABLE pilot response available to the Current Controller (CWP).
Title	DCL message responses distribution to CWP
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

10 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-HMIC.0010	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

12 [REQ]

Identifier	REQ-10.07.01-TS-3124.007
Requirement	The DCL service **shall** support the downlink of the departure clearance request from the aircraft via the DM139 TBD CPDLC message REQUEST DEPARTURE CLEARANCE [departure clearance request data].
Title	DCL request message reception
Status	<Validated>

Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

1
2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RPFG.0025	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

3
4 [REQ]

Identifier	REQ-10.07.01-TS-3124.008
Requirement	The possible responses to a departure clearance request **shall** be one of the following: ✈ [departure clearance enhanced] (UM264) ✈ STANDBY (UM1) ✈ UNABLE (UM0)
Title	DCL request responses sending
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

5
6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-HMIC.0004	<Partial>

7
8 [REQ]

Identifier	REQ-10.07.01-TS-3124.009
Requirement	The departure clearance request received **shall** be notified to the Current Controller (CWP).
Title	DCL message request distribution to CWP
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

9
10 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-HMIC.0002	<Partial>

11
12 [REQ]

Identifier	REQ-10.07.01-TS-3124.010
Requirement	The DCL service, for downlink and uplink messages exchange, **shall** use the Logical Acknowledgment (LACK).
Title	Use of LACK for DCL service
Status	<Validated>
Rationale	

Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

3.1.2.5 Data link Taxi (D-TAXI) service Requirements

A flight due to depart from an airport, or an aircraft that just landed, must obtain a series of clearances from the Controlling Air Traffic Service Unit (C-ATSU) in order to proceed from/to its gate/stand to/from the runway or between any two points on the airport surface. The D-TAXI service provides communications between the flight crew and the ATSU system/controller of the C-ATSU during ground operations, and while the aircraft is approaching the airport.

D-TAXI is used for start-up, push-back, and taxi clearances as well as special airport operations such as taxiing to/from a de-icing area.

Additionally, D-TAXI may be used to provide pre-departure and pre-arrival information related to the expected taxi route.

D-TAXI clearances are not provided once the aircraft leaves the departure holding point for the take-off runway.

D-TAXI clearances (e.g., UM318 CROSS [position information]) are not used to provide clearances to cross active runways.

Note: The D-TAXI service may not be available during the transfer of ATC voice/control communications, depending on the local airport procedures.

D-TAXI function can be defined as a combination of the following 2 sub-functions:

- ✓ ***D-TAXI message management***: this sub function includes datalink messages reception, construction and sending. It allows the pilot to make the most frequently used requests and to receive all clearances and information needed for airport operations by datalink.

- ✓ ***D-TAXI Taxi Route Display:*** this sub function includes ground taxi route information or clearance display on an Airport Moving Map. The Airport Moving Map allows pilots to display the taxi route information (i.e. expected taxi route) envisioned by the ATCOs or the taxi route cleared by the ATCOs.

[REQ]

Identifier	REQ-10.07.01-TS-3125.001
Requirement	The data Link Initiation phase shall be completed to enable D-TAXI exchange according with CPDLC activation requirements being it part of CPDLC application.
Title	D-TAXI CPDLC service
Status	<Validated>
Rationale	To exchange D-TAXI messages with flight the APT control centre has to complete the logon procedure started from the air and open CPDLC connection
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0014	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

1

2 [REQ]

Identifier	REQ-10.07.01-TS-3125.002
Requirement	The D-TAXI shall be able to send all response / clearance received from ATSU/Controller to the aircrew and all request /response received from aircrew to ATSU/Controller.
Title	D-TAXI messages purpose
Status	<Validated>
Rationale	Both control centre and aircraft have to provide an appropriate HMI to perform the D-TAXI exchange messages
Category	<Functional>
Validation Method	
Verification Method	<Inspection>

3

4 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0002	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

5

6 [REQ]

Identifier	REQ-10.07.01-TS-3125.003
Requirement	The ACM service **shall** be completed prior to initiating D-TAXI service.
Title	D-TAXI activation
Status	<Validated>
Rationale	To activate D-TAXi service as part of CPDLC application needs to perform a CPDLC start request and the control centre has to be current data authority.
Category	<Functional>
Validation Method	
Verification Method	<Test>

7

8 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0001	<Partial>

9

10 [REQ]

Identifier	REQ-10.07.01-TS-3125.004
Requirement	The departure information **shall** be either requested by the flight crew, or ATSU/controller initiated.
Title	Starting D-TAXI exchange
Status	<Validated>
Rationale	To avoid that an excess workload, ATCO side, can delay the starting of messages exchange to the aircrew, both aircrew and ATSU have the possibility to start the communication
Category	<Functional>
Validation Method	
Verification Method	<Test>

11

12 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0003	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

1

2   [REQ]

Identifier	REQ-10.07.01-TS-3125.005
Requirement	The D-TAXI Function **shall** support the Departure Information request by the ATSU/Controller.
Title	Crew requesting D-TAXI
Status	<Validated>
Rationale	Adherence to the WG78/SC214 standard
Category	<Functional>
Validation Method	
Verification Method	<Test>

3

4   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0003	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

5

6   [REQ]

Identifier	REQ-10.07.01-TS-3125.006
Requirement	The D-TAXI Function **shall** support the Departure Information request by the ATSU/Controller.
Title	ATSU initiating D-TAXI
Status	<Validated>
Rationale	Adherence to the WG78/SC214 standard
Category	<Functional>
Validation Method	
Verification Method	<Test>

7

8   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0003	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

9

10   [REQ]

Identifier	REQ-10.07.01-TS-3125.007
Requirement	The D-TAXI start-up clearance **shall** be either requested by the flight crew, or ATSU/controller initiated
Title	D-TAXI STARTUP initiating
Status	<Validated>
Rationale	Adherence to the WG78/SC214 standard
Category	<Functional>
Validation Method	
Verification Method	<Test>

11

12   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0003	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

13

14   [REQ]

Identifier	REQ-10.07.01-TS-3125.008
Requirement	The D-TAXI Function **shall** support the Start-Up clearance requested by the flight crew .
Title	STARTUP handshake crew starting
Status	<Validated>
Rationale	Adherence to the WG78/SC214 standard
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0200	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

[REQ]

Identifier	REQ-10.07.01-TS-3125.009
Requirement	The D-TAXI Function **shall** support the Start-Up clearance requested by the ATSU/Controller.
Title	STARTUP handshake ATSU starting
Status	<Validated>
Rationale	Adherence to the WG78/SC214 standard
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0201	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

[REQ]

Identifier	REQ-10.07.01-TS-3125.010
Requirement	The D-TAXI Push-Back clearance **shall** be either requested/sent by the flight crew, or ATSU/controller initiated.
Title	PUSH BACK handshake starting
Status	<Validated>
Rationale	Adherence to the WG78/SC214 standard
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0003	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

[REQ]

Identifier	REQ-10.07.01-TS-3125.011
Requirement	The D-TAXI Function **shall** support the Push-Back clearance requested by the flight crew.

Title	PUSH BACK handshake crew starting
Status	<Validated>
Rationale	Adherence to the WG78/SC214 standard
Category	<Functional>
Validation Method	
Verification Method	<Test>

1

2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0300	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

3

4 [REQ]

Identifier	REQ-10.07.01-TS-3125.012
Requirement	The D-TAXI Function **shall** support the Push-Back clearance sent by the ATSU/Controller.
Title	PUSH BACK handshake ATSU starting
Status	<Validated>
Rationale	Adherence to the WG78/SC214 standard
Category	<Functional>
Validation Method	
Verification Method	<Test>

5

6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0301	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

7

8 [REQ]

Identifier	REQ-10.07.01-TS-3125.013
Requirement	The D-TAXI Taxi-Out clearance **shall** be either sent by the flight crew, or ATSU/controller initiated.
Title	TAXI OUT handshake starting
Status	<Validated>
Rationale	Taxi-out allows the flight crew to receive taxi route information prior to taxi and to receive taxi-out clearances
Category	<Functional>
Validation Method	
Verification Method	<Test>

9

10 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0003	<Partial>

11

12 [REQ]

Identifier	REQ-10.07.01-TS-3125.014
Requirement	The D-TAXI Function **shall** support the Taxi-Out clearance sent by the flight crew.
Title	TAXI OUT handshake crew starting
Status	<Validated>

founding members

Rationale	Taxi-out allows the flight crew to receive taxi route information prior to taxi and to receive taxi-out clearances
Category	<Functional>
Validation Method	
Verification Method	<Test>

1
2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0400	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

3
4 [REQ]

Identifier	REQ-10.07.01-TS-3125.015
Requirement	The D-TAXI Function **shall** support the Taxi-Out clearance sent by the ATSU/Controller.
Title	TAXI OUT handshake ATSU starting
Status	<Validated>
Rationale	Taxi-out allows the flight crew to receive taxi route information prior to taxi and to receive taxi-out clearances
Category	<Functional>
Validation Method	
Verification Method	<Test>

5
6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0401	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

7
8 [REQ]

Identifier	REQ-10.07.01-TS-3125.016
Requirement	The D-TAXI Arrival Taxi Information **shall** be either requested by the flight crew, or ATSU/controller initiated.
Title	TAXI ARRIVAL handshake starting
Status	<Validated>
Rationale	Arrival taxi information allows the flight crew to request and/or receive arrival taxi information prior to the final approach
Category	<Functional>
Validation Method	
Verification Method	<Test>

9
10 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0003	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

11
12 [REQ]

Identifier	REQ-10.07.01-TS-3125.017
Requirement	The D-TAXI Function **shall** support the Arrival Taxi Route Information requested by the flight crew.
Title	TAXI ARRIVAL handshake crew starting
Status	<Validated>

Rationale	Arrival taxi information allows the flight crew to request and/or receive arrival taxi information prior to the final approach
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

[REQ]

Identifier	REQ-10.07.01-TS-3125.018
Requirement	The D-TAXI Function **shall** support the Arrival Taxi Route Information sent by the ATSU/Controller.
Title	TAXI ARRIVAL handshake ATSU starting
Status	<Validated>
Rationale	Arrival taxi information allows the flight crew to request and/or receive arrival taxi information prior to the final approach
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

[REQ]

Identifier	REQ-10.07.01-TS-3125.019
Requirement	The D-TAXI Taxi-In Clearance **shall** be either requested by the flight crew, or ATSU/controller initiated.
Title	TAXI IN handshake starting
Status	<Validated>
Rationale	Taxi-in allows the flight crew to receive taxi route information prior to landing and receive taxi-route clearances after landing and cleared of the runway
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0003	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0002	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

[REQ]

Identifier	REQ-10.07.01-TS-3125.020
Requirement	The D-TAXI Function **shall** support the Taxi-In Clearance requested by the flight crew.
Title	TAXI IN handshake crew starting
Status	<Validated>
Rationale	Taxi-in allows the flight crew to receive taxi route information prior to landing and receive taxi-route clearances after landing and cleared of the runway

Category	<Functional>
Validation Method	
Verification Method	<Test>

1

2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0400	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

3

4 [REQ]

Identifier	REQ-10.07.01-TS-3125.021
Requirement	The D-TAXI Function **shall** support the Taxi-In Clearance sent by the ATSU/Controller.
Title	TAXI IN handshake ATSU starting
Status	<Validated>
Rationale	Taxi-in allows the flight crew to receive taxi route information prior to landing and receive taxi-route clearances after landing and cleared of the runway
Category	<Functional>
Validation Method	
Verification Method	<Test>

5

6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0401	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

7

8 [

9 [REQ]

Identifier	REQ-10.07.01-TS-3125.024
Requirement	The D-TAXI Function **shall** support the Taxi-Update clearance sent by the ATSU/Controller.
Title	TAXI UPDATE handshake ATSU starting
Status	<Validated>
Rationale	The updated clearance cover either: it is the continuation - extension of a taxi clearance issued when the flight crew has reached the end of the first taxi clearance but has not reached the desired destination; or it is a revision – change to any previous taxi route clearance (may also contain continuation data).
Category	<Functional>
Validation Method	
Verification Method	<Test>

10

11 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0407	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

12

13 [REQ]

Identifier	REQ-10.07.01-TS-3125.028
Requirement	The DTAXI Function **shall** support at least the set of mandatory messages listed in table 3 and 4 of appendix A.2 .
Title	Mandatory DTAXI messages
Status	<Validated>
Rationale	The referenced standard WG78/SC214 has established the minimum set of

	messages assigning them as mandatory according with airport roles.
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0002	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

[REQ]

Identifier	REQ-10.07.01-TS-3125.029
Requirement	The D-TAXI Function **shall** support the ATSU/Controller to discriminate urgent and distress messages from routine messages that are sent to the flight crew.
Title	D-TAXI ALERT attribute management
Status	<Validated>
Rationale	Any urgent or distress request came in from aircrew has to be highlighted to ATCO for a quickly response.
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0500	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

[REQ]

Identifier	REQ-10.07.01-TS-3125.031
Requirement	The D-TAXI Function **shall** display the flight crew's answer.
Title	DTAXI crew response presentation
Status	<Validated>
Rationale	The ATCO has to know the aircrew response to evaluate that tactical order is accepted and completed
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0500	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A

[REQ]

identifier	REQ-10.07.01-TS-3125.033
Requirement	Loss of D-TAXI when aircraft is on the ground (prior to take-off) and approach (prior to landing) **shall** to be shown to the Controller and the communications to be reverted to voice.
Title	Loss of D-TAXI service
Status	<Validated>
Rationale	The purpose of requirements is when CPDLC communication capability is lost for one user. This prevents the controller from issuing clearances to this aircraft using the D-TAXI data link service. This situation can be handle by

	means the use of lack, timers and so on.
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0506	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

[REQ]

Identifier	REQ-10.07.01-TS-3125.034
Requirement	The D-TAXI Function **shall** support The STANDBY answer to start-up clearance requested by the flight crew
Title	STANDBY response to STARTUP request
Status	<Validated>
Rationale	The ATSU/Controller according with standard has to perform the standby message to the start-up request
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0202	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

[REQ]

Identifier	REQ-10.07.01-TS-3125.035
Requirement	The D-TAXI Function **shall** support The UNABLE answer to Start-Up clearance requested by the flight crew
Title	UNABLE response to STARTUP request
Status	<Validated>
Rationale	The ATSU/Controller according with standard has to perform the unable message to the start-up request
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0203	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

[REQ]

Identifier	REQ-10.07.01-TS-3125.036
Requirement	The D-TAXI Function **shall** support The EXPECTED STARTUP AT [TIME] answer to Start-Up clearance requested by the flight crew
Title	EXPECTED STARTUP response to STARTUP request
Status	<Validated>
Rationale	The ATCO need to notify that the start-up may to be issue to meet the specified time.
Category	<Functional>

Validation Method	
Verification Method	<Test>

1

2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0207	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

3

4 [REQ]

Identifier	REQ-10.07.01-TS-3125.037
Requirement	The D-TAXI Function **shall** support the STANDBY answer to Start-Up clearance requested by the ATSU/Controller.
Title	STANDBY RESPONSE to STARTUP CLEARANCE
Status	<Validated>
Rationale	Flight crew need to answer standby before whether not all preliminary operations are accomplished
Category	<Functional>
Validation Method	
Verification Method	<Test>

5

6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0204	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

7

8 [REQ]

Identifier	REQ-10.07.01-TS-3125.038
Requirement	The D-TAXI Function **shall** support the UNABLE answer to Start-Up clearance requested by the ATSU/Controller.
Title	UNABLE RESPONSE to STARTUP CLEARANCE
Status	<Validated>
Rationale	If not all preliminary operations to departure are accomplished the flight crew need to answer unable
Category	<Functional>
Validation Method	
Verification Method	<Test>

9

10 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0205	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

11

12 [REQ]

Identifier	REQ-10.07.01-TS-3125.039
Requirement	The D-TAXI Function **shall** support the WILCO answer to Start-Up clearance requested by the ATSU/Controller.
Title	WILCO RESPONSE to STARTUP CLEARANCE
Status	<Validated>
Rationale	Flight crew is ready to STARTUP clearance
Category	<Functional>
Validation Method	
Verification Method	<Test>

13

14 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0206	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

1

2 [REQ]

Identifier	REQ-10.07.01-TS-3125.040
Requirement	The D-TAXI Function **shall** support The STANDBY answer to PUSHBACK clearance requested by the flight crew
Title	STANDBY RESPONSE to PUSHBACK REQUEST
Status	<Validated>
Rationale	The ATCO need to answer STANDBY whether he is not yet ready to confirm pushback clearance.
Category	<Functional>
Validation Method	
Verification Method	<Test>

3

4 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0302	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

5

6 [REQ]

Identifier	REQ-10.07.01-TS-3125.041
Requirement	The D-TAXI Function **shall** support The UNABLE answer to PUSHBACK clearance requested by the flight crew
Title	UNABLE RESPONSE to PUSHBACK REQUEST
Status	<Validated>
Rationale	ATCO need to answer unable whether any preliminary condition to pushback is not accomplished
Category	<Functional>
Validation Method	
Verification Method	<Test>

7

8 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0303	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

9

10 [REQ]

Identifier	REQ-10.07.01-TS-3125.042
Requirement	The D-TAXI Function **shall** support The EXPECTED PUSHBACK [TIME] answer to PUSHBACK clearance requested by the flight crew
Title	EXPECTED RESPONSE to PUSHBACK REQUEST
Status	<Validated>
Rationale	The ATCO need to notify that the start-up may to be issue to meet the specified time
Category	<Functional>
Validation Method	
Verification Method	<Test>

11

12 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0304	<Partial>

<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

1

2   [REQ]

Identifier	REQ-10.07.01-TS-3125.043
Requirement	The D-TAXI Function **shall** support the STANDBY answer to PUSHBACK clearance requested by the ATSU/Controller.
Title	STANDBY RESPONSE to PUSHBACK CLEARANCE
Status	<Validated>
Rationale	Flight crew need to answer standby whether not all preliminary operations are accomplished
Category	<Functional>
Validation Method	
Verification Method	<Test>

3

4   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0306	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

5

6   [REQ]

Identifier	REQ-10.07.01-TS-3125.044
Requirement	The D-TAXI Function **shall** support the UNABLE answer to PUSHBACK clearance requested by the ATSU/Controller.
Title	UNABLE RESPONSE to PUSHBACK CLEARANCE
Status	<Validated>
Rationale	Flight crew need to answer unable whether preliminary operations aren't accomplished
Category	<Functional>
Validation Method	
Verification Method	<Test>

7

8   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0307	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

9

10   [REQ]

Identifier	REQ-10.07.01-TS-3125.045
Requirement	The D-TAXI Function **shall** support the WILCO answer to PUSHBACK clearance requested by the ATSU/Controller.
Title	WILCO RESPONSE to PUSHBACK CLEARANCE
Status	<Validated>
Rationale	All conditions to execute pushback are accomplished then the flight crew answer WILCO.
Category	<Functional>
Validation Method	
Verification Method	<Test>

11

12   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0308	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

13

14   [REQ]

Identifier	REQ-10.07.01-TS-3125.046
Requirement	The D-TAXI Function shall support the STANDBY answer to Taxi-Out, Taxi-in clearance sent by the flight crew
Title	STANDBY RESPONSE to TAXI REQUEST
Status	<Validated>
Rationale	ATSU/Controller need to answer standby to a Taxi request coming from flight.
Category	<Functional>
Validation Method	
Verification Method	<Test>

1
2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0402	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

3
4 [REQ]

Identifier	REQ-10.07.01-TS-3125.047
Requirement	D-TAXI shall be able to answer UNABLE to a Taxi request coming from a flight when any condition necessary for its issue is not met.
Title	UNABLE RESPONSE to TAXI REQUEST
Status	<Validated>
Rationale	ATSU/Controller need to answer unable to a Taxi request coming from flight.whether any preliminary condition to issue it aren't met.
Category	<Functional>
Validation Method	
Verification Method	<Test>

5
6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0403	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

7
8 [REQ]

Identifier	REQ-10.07.01-TS-3125.048
Requirement	The D-TAXI Function shall support the STANDBY answer to Taxi-Out, Taxi-in, Taxi update clearance sent by the ATSU/Controller
Title	STANDBY RESPONSE TO TAXI and TAXI UPDATE CLEARANCE
Status	<Validated>
Rationale	Flight crew need to answer standby to a Taxi and Taxi Update clearance coming from ATCO
Category	<Functional>
Validation Method	
Verification Method	<Test>

9
10 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0404	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

11
12 [REQ]

Identifier	REQ-10.07.01-TS-3125.049
Requirement	The D-TAXI Function shall support the UNABLE answer to Taxi-Out, Taxi-in, Taxi update clearance sent by the ATSU/Controller

Title	UNABLE RESPONSE TO TAXI AND TAXI UPDATE CLEARANCE
Status	<Validated>
Rationale	Flight crew need to answer unable to a Taxi and Taxi Update clearance coming from ATCO
Category	<Functional>
Validation Method	
Verification Method	<Test>

1
2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0405	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

3
4 [REQ]

Identifier	REQ-10.07.01-TS-3125.050
Requirement	The D-TAXI Function shall support the WILCO answer to Taxi-Out, Taxi-in, Taxi update clearance sent by the ATSU/Controller
Title	WILCO RESPONSE TO TAXI AND TAXI UPDATE CLEARANCE
Status	<Validated>
Rationale	Flight crew need to answer wilco to a Taxi and Taxi Update clearance coming from ATCO if there aren't any constraints
Category	<Functional>
Validation Method	
Verification Method	<Test>

5
6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0406	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

7
8 [REQ]

Identifier	REQ-10.07.01-TS-3125.051
Requirement	The D-TAXI Function shall support the roger answer to Arrival Taxi Route Information sent by by the ATSU/Controller.
Title	ROGER RESPONSE TO EXPECT TAXI CLEARANCE
Status	<Validated>
Rationale	Indication flight crew side that the Expect taxi route sent by ATCO has been received and understood
Category	<Functional>
Validation Method	
Verification Method	<Test>

9
10 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

11
12 [REQ]

Identifier	REQ-10.07.01-TS-3125.052
Requirement	The D-TAXI Function shall support the For De-icing request message by the flight crew.
Title	REQUEST DE-ICING
Status	<Validated>
Rationale	Remind for ATCO (taxi route planning service) to provide taxi route pass

	through de-icing area.
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Aircraft & Vehicle Datalink Management	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.02.01	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RPSD.0001	<Partial>
<SATISFIES>	<Enabler>	AERODROME-ATC-02a	<Partial>

3.1.2.6 4D Trajectory Data link (4DTRAD) service Requirements

The 4DTRAD service uses CPDLC for the provision of 4D clearances; and ADS-C for acquiring trajectory data from the aircraft by the 4DTRAD service provider for:

- ✓ Enhanced trajectory definition and prediction,

- ✓ Trajectory intent and trajectory constraint coordination, and

- ✓ Trajectory intent and trajectory constraint conformance monitoring.

The 4DTRAD service supports dynamic demand and capacity balancing and traffic sequencing during the flight for non-time-critical communication.

The 4DTRAD service enables the negotiation and synchronization of trajectory data between ground and air systems. This includes the exchange of 4-dimensional clearances and intent information such as lateral, longitudinal, vertical and time or speed (including uplinked constraints specified as cleared speed / time constraints which can be issued as a part of a route clearance).

The 4DTRAD service supports the following:

- ✓ Aircraft trajectory downlink

- ✓ Air/ground synchronised trajectory

- ✓ Route clearance and constraints uplink

    - ✓ 4-dimensional route clearances
    - ✓ Either:
        - • Trajectory constraints embedded within the 4DTRAD route clearance, or
        - • Speed or time constraints uplinked separately from the route clearance

- ✓ 4D trajectory revision/update

- ✓ 4DTRAD clearance requests

- ✓ 4D trajectory intent conformance monitoring

    - ✓ Monitoring of the aircraft system derived projected trajectory to ensure detection of differences between the airborne and the ground system current flight plan.

    - ✓ Monitoring of compatibility between uplinked cleared constraints and the active route in the aircraft's system.

- ✓ Ground system coordination and notification of 4D trajectories (excluded from the scope of this P10.7.1 project)

Note: Within the scope of SESAR Storyboard Step 1 (TiBO) **only one time constraint is permitted at any given time**.

[REQ]

Identifier	REQ-10.07.01-TS-3126.0001
Requirement	SESAR 10.07.01 project targets **shall** comply with operational, safety, performance and interoperability requirements defined by WG78/SC214

	(Advanced ATS Data Communication SPR & Interop) for the development and the validation of the 4DTRAD service, as part of the CPDLC application. Also the agreed PDRs list included in Appendix B is applied.
Title	Project Targets for 4DTRAD service (CPDLC part)
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

1
2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<Enabler>	ER APP ATC 100	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0050	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0060	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0310	<Partial>

3
4 [REQ]

Identifier	REQ-10.07.01-TS-3126.0002
Requirement	The SESAR 10.07.01 project **shall** support data link aspects of the operational concept as defined in the 4DTRAD Operational Concept v1_0_final [5] when related to the air-ground functionality.
Title	4DTRAD Operational concept
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

5
6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 100	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0310	<Partial>

7
8 [REQ]

Identifier	REQ-10.07.01-TS-3126.0003
Requirement	As a general requirement, the management of INITIAL 4D CPDLC **shall** comply with messages as defined in table 5-30, column 4DTRAD Time Level and in table 5-31, column 4DTRAD in the "Data Communications Safety and Performance Requirements version H - Part 3 CPDLC" and further refined interoperability SESAR document 9.1D2 & 9.33 D2 ("Interface document between A/C and ground tools").
Title	CPDLC messages for 4DTRAD service
Status	<Validated>
Rationale	*Note-1:* "SESAR WP9.1 D2 aircraft _ATC systems Interface.doc" applies as initial ac/ATC system interface see ref [26]. *Note-2:* This corresponds to the set of message required to operate Initiate 4D function.
Category	<Functional>
Validation Method	
Verification Method	<Test>

1
2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0020.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0020.0130	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0310	<Partial>

3
4 [REQ]

Identifier	REQ-10.07.01-TS-3126.0004
Requirement	The INITIAL 4D function **shall** support the automatic upload of agreed 2D route clearances with time, altitude or speed constraints as required in SPR Version H Part 6 and further refined in interoperability SESAR document 9.1D2 & 9.33 D2 ("Interface document between A/C and ground tools").
Title	2D Route Clearance sending
Status	<Validated>
Rationale	Note-1: This corresponds to CPDLC "load" selection on Data-Link Control & Display Unit (DCDU)/mailbox
Category	<Functional>
Validation Method	
Verification Method	<Test>

5
6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 100	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0020.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0020.0130	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG03.0100	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F060-0070	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F060-0080	<Partial>

7
8 [REQ]

Identifier	REQ-10.07.01-TS-3126.0005
Requirement	INITIAL 4D function **shall** provide the capability to define a RTA constraint on any waypoint (except pseudo waypoint) of the flight plan.
Title	RTA capability
Status	<Validated>
Rationale	*Note-1*: RTA function is expected to provide operational benefit in all flight phase of a flight.
Category	<Functional>
Validation Method	
Verification Method	<Test>

9
10 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149c	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0020.0130	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG05.0700	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG06.0200	<Partial>

11
12 [REQ]

Identifier	REQ-10.07.01-TS-3126.0006
Requirement	INITIAL 4D function **shall** support for Release 1 out of the total scope/message set as defined in the EUROCAE WG78/RTCA SC-214 Version H at least the messages as provided in Appendix A-1 to support the 2011 simulations/live trial.
Title	I4D CPDLC message set support
Status	\<Validated>
Rationale	
Category	\<Functional>
Validation Method	
Verification Method	\<Test>

1

2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
\<ALLOCATED_TO>	\<Functional block>	Air/Ground Datalink Service	N/A
\<ALLOCATED_TO>	\<Functional block>	Air/Ground Datalink Comunications	N/A
\<APPLIES TO>	\<Operational Focus Area>	OFA04.01.02	N/A
\<SATISFIES>	\<Enabler>	ER APP ATC 119	\<Partial>
\<SATISFIES>	\<ATMS Requirement>	REQ-04.03-i4D-0010.0020	\<Partial>
\<SATISFIES>	\<ATMS Requirement>	REQ-04.03-i4D-0020.0130	\<Partial>
\<SATISFIES>	\<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0310	\<Partial>

3

4 [REQ]

Identifier	REQ-10.07.01-TS-3126.0007
Requirement	INITIAL 4D function **shall** automatically uplink a CPDLC free text message (UM183) to i4D equipped aircraft upon *Assume,* to indicate to the pilot that he/she entered an i4D area.
Title	I4D Area notification message sending
Status	\<Validated>
Rationale	*Note:* This requirement is only to make the pilots aware that they entered an "i4D area", assuming a possibly different way of flying the aircraft. No additional i4D functional requirements are linked to this one
Category	\<Functional>
Validation Method	
Verification Method	\<Test>

5

6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
\<ALLOCATED TO>	\<Functional block>	Air/Ground Datalink Service	N/A
\<ALLOCATED TO>	\<Functional block>	Air/Ground Datalink Comunications	N/A
\<APPLIES_TO>	\<Operational Focus Area>	OFA04.01.02	N/A
\<SATISFIES>	\<Enabler>	ER APP ATC 119	\<Partial>
\<SATISFIES>	\<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0310	\<Partial>

7

8 [REQ]

Identifier	REQ-10.07.01-TS-3126.0008
Requirement	INITIAL 4D function **shall** after a confirmation/agreement by the Current Controller uplink the RTA request via one of the *Crossing Constraints* messages.
Title	CPDLC message for RTA support
Status	\<Validated>
Rationale	*Note*: Uplinked Crossing Constrains messages provide the capability to request to a/c compute time estimates for any flight plan waypoint with a resolution of 1sec (according to ref A.1).
Category	\<Functional>
Validation Method	
Verification Method	\<Test>

9

1 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149c	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F080-0040	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F080-0070	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG05.0700	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG06.0200	<Partial>

2
3 [REQ]

Identifier	REQ-10.07.01-TS-3126.0009
Requirement	INITIAL 4D function **shall** make the received WILCO or UNABLE available to the Current Controller (CWP)
Title	4DTRAD CPDLC responses distribution to CWP
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

4
5 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F080-0140	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F080-0180	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.014	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG06.0200	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG06.0400	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG06.0500	<Partial>

6
7 [REQ]

Identifier	REQ-10.07.01-TS-3126.0010
Requirement	INITIAL 4D function **shall** support the cancelation of a time constraint (RTA) by the ATSP.
Title	RTA constraint cancellation
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

8
9 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149c	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-1030.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG06.0200	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F080-0130	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F080-0140	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F080-0170	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F080-0180	<Partial>

10
11 [REQ]

Identifier	REQ-10.07.01-TS-3126.0011
Requirement	INITIAL 4D function **shall** be able to process waypoints provided via ADS-C as a mix of lat/long and/or fix names.
Title	Waypoint extraction from ADS-C
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

1
2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0020.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG02.0200	<Partial>

3
4 [REQ]

Identifier	REQ-10.07.01-TS-3126.0012
Requirement	INITIAL 4D function **shall** be able to filter out Pseudo Waypoints, which do not fall in to the following categories: ✈ Fixes; ✈ ToD/ToC; ✈ Lat/Long; ✈ Offset/Overfly.
Title	Waypoint filtering from ADS-C
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

5
6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0020.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG02.0200	<Partial>

7
8 [REQ]

Identifier	REQ-10.07.01-TS-3126.0013
Requirement	INITIAL 4D function **shall** support the uplink of the unchanged 2D route (as available in the Ground system) into one of the RouteClearanceEnhanced messages (UM 266, UM 267 or UM 268).
Title	Unchanged 2D Route Clearance Uplink
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

9

1 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 100	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-1010.0050	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG03.0100	<Partial>

2 [REQ]

Identifier	REQ-10.07.01-TS-3126.0014
Requirement	INITIAL 4D function **shall** support the uplink of a modified route (2D, 3D or 3D+Time) in to one of the RouteClearanceEnhanced messages, (UM 266, UM 267 or UM 268).
Title	Modified Route Clearance Uplink
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

3
4 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 100	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-1010.0050	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-1010.0040	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0020.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG03.0100	<Partial>

5
6 [REQ]

Identifier	REQ-10.07.01-TS-3126.0015
Requirement	INITIAL 4D function **shall** support uplink the *RouteClearanceEnhanced* message UM266 as selected by the Controller and concatenate UM289 according to the rules described below: ✈ In case a new route ends on a waypoint not being the destination: UM266 shall be concatenated with UM289. ✈ In case a new route ends at the destination: UM266 shall not be concatenated with UM289.
Title	Route Clearance Concatenated with UM289
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

7
8 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 100	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-1010.0050	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG03.0100	<Partial>

9
10 [REQ]

Identifier	REQ-10.07.01-TS-3126.0016

Requirement	In case the constructed/modified route will be uplinked with the UM 267 or UM268 messages, the applicable uplink message **shall** be completed by the INITIAL 4D function with the route up till the destination.
Title	Route Clearance rules without UM289
Status	<Validated>
Rationale	*Note: No UM289 shall be used*
Category	<Functional>
Validation Method	
Verification Method	<Test>

1
2   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 100	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-1010.0050	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG03.0100	<Partial>

3
4   [REQ]

Identifier	REQ-10.07.01-TS-3126.0017
Requirement	The INITIAL 4D function **shall** add to the *RouteClearanceEnhanced* messages the level constraint(s) (up till the maximum of the number of level constraints as specified in the ASN1 definition).
Title	Route Clearance with level constraints
Status	<Validated>
Rationale	*Note 1: In the current ASN1 definitions the number of level constraints per flight is 10*
Category	<Functional>
Validation Method	
Verification Method	<Test>

5
6   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 100	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-1010.0050	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F060-0100	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG03.0100	<Partial>

7
8   [REQ]

Identifier	REQ-10.07.01-TS-3126.0018
Requirement	The INITIAL 4D function **shall** add to the *RouteClearanceEnhanced* messages the single time constraint(s).
Title	Route Clearance with time constraint
Status	<Validated>
Rationale	*Note 1: for SESAR i4D activities the number of time constraints being assigned to a flight is limited to one (1).*
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 100	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-1010.0050	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG03.0100	<Partial>

[REQ]

Identifier	REQ-10.07.01-TS-3126.0019
Requirement	The INITIAL 4D function **shall** support the following replies to the pilot when a DM121(airborne requested clearance) has been received: ✈ UNABLE ✈ STANDBY ✈ Accepted by uplinking it as described in requirement trajectory uplink process above.
Title	Clearance Request responses sending
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0050	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG03.0100	<Partial>

3.1.3 Automatic Dependent Surveillance - Contract (ADS-C) Application

The ADS-C application provides the 4DTRAD service.

The functions for Advanced Services ADS-C include the following functions:

1. **On Demand**: The demand contract provides the capability for a ATSU system to request a single ADS-C report from an aircraft and specify which optional ADS-C data are required (if any) in addition to the basic ADS-C information. When requesting the establishment of an ADS-C demand contract, the ATSU system provides an indication of any data required in addition to the basic report. This data includes *MET data*, *min/max ETA*, and *EPP data*

2. **On a Periodic basis**: The periodic contract provides the capability for an ATSU to request and receive periodic reports from an aircraft and to specify which optional ADS-C data is required (if any) in addition to the basic ADS-C *information*

3. **when triggered by an Event**: The only event for 4DTRAD is the EPP Change event

4. **In an emergency and/or urgency condition**: Whenever an ADS-C contract is requested or a periodic or event contract has been established and when the aircraft is in or goes into, or changes emergency/urgency alert ADS-C operates in the emergency/urgency mode

The ATSUs are capable of requesting up to three different types of contracts simultaneously with all equipped aircraft to obtain information from the aircraft system elements. Only one contract of a type per aircraft is permitted. Therefore, if the ground system sends a contract request to an aircraft for a periodic or event contract, and either of these two contracts already exists with that aircraft from that ground system, then the new contract request will override the previous contract for that type. In other words, acceptance of an event or periodic contract request implicitly cancels an existing respective event or periodic contract. Since the demand contract is satisfied by sending a single report, any number of demand contracts may be satisfied with a single aircraft, but only one "demand" at the time.

The aircraft system elements are capable of providing ADS-C reports to support the contract requests. The ADS-C reports are similar in structure, but the content and the conditions under which the report is sent varies depending on the type of contract request and the conditions specified in the request.

The aircraft system elements are capable of supporting contract requests with maximum four ATC ground systems simultaneously. They are also capable of supporting one demand, one event and one periodic contract request with each ATSU simultaneously. If the pilot or aircraft system element elects, the avionics is capable of transitioning any existing contract to emergency/urgency status with each ground system for which it has an ADS contract.

Different services may levy different requirements on the ADS-C application. For example, 4DTRAD may require specific parameters in reports which are not necessary for other services. It should be noted that only one event and periodic contract may be in force between an aircraft system and an ATSU system at one time. It is imperative that ATSU systems coordinate the parameters, reporting interval and event requirements so that the different services may both successfully use the ADS-C application. This must also be taken into consideration when cancelling an existing contract for one service while another service is still expecting ADS-C report information.

The ADS-C application provides automatic reports from an aircraft to an ATSP system, it is a system-to-system activity without the pilot in the loop.

SESAR 10.07.01 project will not implement a prototype product providing both FANS A (ED100A/DO258A compliant ATS Datalink applications) and WG78/SC214 Advanced ATS Datalink applications.

Note1: Only WG78/SC214 Advanced ATS Datalink applications, over ATN, are considered necessary for SESAR validation effort

3.1.3.1 4D Trajectory Data link (4DTRAD) service Requirement

The 4DTRAD service uses CPDLC for the provision of 4D clearances; and ADS-C for acquiring trajectory data from the aircraft by the 4DTRAD service provider for:

- ✓ Enhanced trajectory definition and prediction,

- ✓ Trajectory intent and trajectory constraint coordination, and

- ✓ Trajectory intent and trajectory constraint conformance monitoring.

The 4DTRAD service supports dynamic demand and capacity balancing and traffic sequencing during the flight for non-time-critical communication.

The 4DTRAD service enables the negotiation and synchronization of trajectory data between ground and air systems. This includes the exchange of 4-dimensional clearances and intent information such as lateral, longitudinal, vertical and time or speed (including uplinked constraints specified as cleared speed / time constraints which can be issued as a part of a route clearance).

1   The 4DTRAD service supports the following:

2   ✓ Aircraft trajectory downlink

3   ✓ Air/ground synchronised trajectory

4   ✓ Route clearance and constraints uplink

5   ✓ 4-dimensional route clearances
6   ✓ Either:
7   • Trajectory constraints embedded within the 4DTRAD route clearance, or
8   • Speed or time constraints uplinked separately from the route clearance

9   ✓ 4D trajectory revision/update

10   ✓ 4DTRAD clearance requests

11   ✓ 4D trajectory intent conformance monitoring

12   ✓ Monitoring of the aircraft system derived projected trajectory to ensure detection of
13   differences between the airborne and the ground system current flight plan.
14
15   ✓ Monitoring of compatibility between uplinked cleared constraints and the active route
16   in the aircraft's system.

17   ✓ Ground system coordination and notification of 4D trajectories

18   Note: Within the scope of SESAR Storyboard Step 1 (TiBO) o**nly one time constraint is permitted**
19   **at any given time.**
20
21   [REQ]

Identifier	REQ-10.07.01-TS-3131.001
Requirement	SESAR 10.07.01 project targets **shall** comply with operational, safety, performance and interoperability requirements defined by WG78/SC214 (Advanced ATS Data Communication SPR & Interop) for the development and the validation of the 4DTRAD service, as part of the ADS-C application. Also the agreed PDRs list included in Appendix B is applied.
Title	Project Targets for 4DTRAD service
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

22
23   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

24
25   [REQ]

Identifier	REQ-10.07.01-TS-3131.002
Requirement	INITIAL 4D function shall provide the capability to process and manage ADS-C "EPP report" contract as defined in SPR version H part 4 and further refined in interoperability SESAR document 9.1D2 & 9.33 D2 ("Interface document between A/C and ground tools").
Title	ADS-C "EPP report" contract
Status	<Validated>

Rationale	*Note-1:* "SESAR WP9.1 D2 aircraft _ATC systems Interface.doc" applies as initial ac/ATC system interface see ref [26] *Note-2*: The ADS-C "EPP report" will include the airborne 4D predicted trajectory. Nominal use of this report is ON EVENT or PERIODIC "EPP change». Content and mechanization of this message is detailed in SPR Version H Part 4. Not all ADS-C variables will be implemented. A complete list of implemented variables will be described in SESAR 9.1D2 & 9.33 D2 "Interface document between A/C and ground tools
Category	<Functional>
Validation Method	
Verification Method	<Test>

1

2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0020.0010	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0030	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0040	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F060-0030	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F060-0040	<Partial>
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG02.0200	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG07.0300	<Partial>

3

4 [REQ]

Identifier	REQ-10.07.01-TS-3131.003
Requirement	The 4D predicted trajectory to be downlinked to the ground shall include a reliability status indicating whether the computed information is reliable or not as defined in SPR Version H Part 4 and further refined in interoperability SESAR document 9.1D2 & 9.33 D2 ("Interface document between A/C and ground tools"). This requirement is not Applicable for Regional a/c
Title	Reliability status of 4D trajectory
Status	<Validated>
Rationale	*Note-1:* To be confirmed into SESAR document "Interface document between aircraft and ATC systems – step1". As discussed within WG78, it is expected to downlink the following data for mainline a/c: ⤳ Aircraft coupled with FMS specified lateral flight plan ⤳ Aircraft coupled with FMS specified vertical flight plan ⤳ Aircraft coupled with FMS specified speed flight plan ⤳ Last time meteorological model of the FMS was updated
Category	<Functional>
Validation Method	
Verification Method	<Test>

5

6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0040	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

1
2   [REQ]

Identifier	REQ-10.07.01-TS-3131.004
Requirement	INITIAL 4D function **shall** provide the capability to process and manage ADS-C "ETAmin/ETAmax report" as defined in SPR Version H Part 4 and further refined in interoperability SESAR document 9.1D2 & 9.33 D2 ("Interface document between A/C and ground tools").
Title	ADS-C "ETAmin/ETAmax report"
Status	<Validated>
Rationale	*Note-1:* "SESAR WP9.1 D2 aircraft _ATC systems Interface.doc" applies as initial ac/ATC system interface see ref [26] *Note-2:* This message is used as the mean to downlink aircraft ETAmin/max to the ground so that ATC can define a feasible RTA. *Note-3:* This report mechanization would be either ON-DEMAND, PERIODIC. Request message would contain waypoint_IDENT for which ETA information is requested. Downlinked information would correspond to reliable ETAmin/max value on requested waypoint
Category	<Functional>
Validation Method	
Verification Method	<Test>

3
4   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0040	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG5a.0400	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F070-0010	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F070-0020	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F070-0030	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F070-0040	<Full>

5
6   [REQ]

Identifier	REQ-10.07.01-TS-3131.006
Requirement	On top of the Version H baseline as mentioned in REQ-10.07.01-TS-3131.001 the "PseudoADSMessage" type as specified in paragraph 2.2.1.7.4.2.6 **shall** be read as "ADSMessage".
Title	"PseudoADSMessage" type as "ADSMessage"
Status	<Validated>
Rationale	Note: The PseudoADSMessage is created solely for the purposes of Application Message Integrity Check computation and is never exchanged over a ADS-C contract.
Category	<Functional>
Validation Method	
Verification Method	<Test>

7
8   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>

1
2   [REQ]

Identifier	REQ-10.07.01-TS-3131.007
Requirement	On top of the Version H baseline as mentioned in REQ-10.07.01-TS-3131.001 the "Security Parameters" (ED110B) as defined in the specific *Version H / PMADS v0.7* document **shall not** be implemented.
Title	Security Parameters
Status	<Validated>
Rationale	*Note: "no security" as a default value (defined in PMADS v0.7 - H § 2.2.1.3.4.7, 2.2.1.3.5.8, 2.2.1.3.6.7)*
Category	<Functional>
Validation Method	
Verification Method	<Test>

3
4   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Services	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

5
6   [REQ]

Identifier	REQ-10.07.01-TS-3131.008
Requirement	On top of the Version H baseline as mentioned in REQ-10.07.01-TS-3131.001 the PM ADS checksum **shall** only be based on the maximum of 7 characters for the Callsign as it is available in the Flight Plan.
Title	PM ADS checksum definition
Status	<Validated>
Rationale	*Note 1: No artificial addition of "spaces" or "0" shall be applied.* *Note 2: Although it should not happen, the use of a Callsign of 8 characters should lead to a controlled error case*
Category	<Functional>
Validation Method	
Verification Method	<Test>

7
8   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

9
10   [REQ]

Identifier	REQ-10.07.01-TS-3131.009
Requirement	The initial 4D FUNCTION **shall** be able to establish the ADS-C Contract <u>before</u> the flight is *Assumed*.
Title	ADS-C Contract establishment
Status	<Validated>
Rationale	

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Category	<Functional>
Validation Method	
Verification Method	<Test>

1
2   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0070	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F060-0020	<Full>
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

3
4   [REQ]

Identifier	REQ-10.07.01-TS-3131.010
Requirement	When the aircraft is ADS-C capable, the i4D Function **shall** automatically make requests for an ADS-C (Periodic and Event) Contracts.
Title	Automatic ADS-C contracts
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

5
6   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0080	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.002	<Partial>
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

7
8   [REQ]

Identifier	REQ-10.07.01-TS-3131.011
Requirement	The INITIAL 4D Function **shall** be able to support the timer values for ADS-C Contract, described in PMADS v0.7, Table 2.2.1.5 1 [3].
Title	Timer values for ADS-C Contract
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

9
10 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0070	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0080	<Partial>
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

1
2   [REQ]

Identifier	REQ-10.07.01-TS-3131.012
Requirement	The INITIAL 4D Function **shall** support the HMI display in order to distinguish between i4D-compliant and non-i4D-compliant aircraft/flights.
Title	Distinguishing between i4D and non-i4D aircrafts
Status	<Validated>
Rationale	*Note:* For this prototype implementation it is assumed that ADS-C ATN equipped aircraft are also supporting the new CPDLC message set.
Category	<Funtional>
Validation Method	
Verification Method	<Test>

3
4   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Services	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-Hi4D.0010	<Full>

5
6   [REQ]

Identifier	REQ-10.07.01-TS-3131.013
Requirement	On receipt of a downlink ADS/IC Data, the INITIAL 4D function **shall** perform the AMIC verification procedure before any other ADS-C Message processing.
Title	AMIC verification procedure
Status	<Validated>
Rationale	*Note: "ADS/IC data" should be understood as being one of the following data:* • *ADS/IC Contract Data,* • *ADS/IC Report Data,* • *ADS/IC Non Compliance Data and* ADS/IC Reject Data.
Category	<Functional>
Validation Method	
Verification Method	<Test>

7
8   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0080	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

9
10   [REQ]

Identifier	REQ-10.07.01-TS-3131.014
Requirement	On receipt of the first downlink ADS/IC Data, the INITIAL 4D function **shall** verify the Application Message Integrity Check (AMIC) verification procedure using: → the ATN Message Checksum verification procedure specified in [3] if the downlink ADS/IC Data does not contain an algorithm identifier or

	contains the "algorithm identifier ATN default checksum";
	Note: see section "2.2.1.7.3 The Application Message Integrity Check" on page 105
	✦ The specified algorithm if the downlink ADS/IC data contains an other algorithm identifier, as specified in.
Title	Application Message Integrity Check (AMIC) verification procedure
Status	<Validated>
Rationale	*Note 1: see ICAO DOC 9880, chapter 6, the definition of the algorithm for the AMIC* *Note 2: for the i4D validation only the default algorithm will be used.*
Category	<Functional>
Validation Method	
Verification Method	<Test>

1
2   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0080	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

3
4   [REQ]

Identifier	REQ-10.07.01-TS-3131.015
Requirement	On receipt of a subsequent downlink ADS/IC Data, the INITIAL 4D function **shall**: ✦ ignore the specified algorithm if the downlink ADS/IC Data contains an algorithm identifier and ✦ verify the AMIC using the AMIC verification procedure used for the preceding downlink ADS/IC Data.
Title	Subsequent downlink ADS/IC Data management
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

5
6   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0080	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

7
8   [REQ]

Identifier	REQ-10.07.01-TS-3131.016
Requirement	On receipt of a downlink ADS/IC data containing an <u>unrecognised</u> AMIC algorithm identifier, the INITIAL 4D function **shall**: ✦ discard the received downlink ADS/IC data and ✦ Invoke the ADS user abort request primitive with the reason parameter set to UserAbortReason value "unknown integrity check".
Title	An unrecognised AMIC algorithm identifier in a downlink ADS/IC data

Status	\<Validated\>
Rationale	
Category	\<Functional\>
Validation Method	
Verification Method	\<Test\>

1

2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
\<APPLIES_TO\>	\<Operational Focus Area\>	OFA04.01.02	N/A
\<ALLOCATED_TO\>	\<Functional block\>	Air/Ground Datalink Comunications	N/A
\<SATISFIES\>	\<Enabler\>	ER APP ATC 119	\<Partial\>
\<SATISFIES\>	\<ATMS Requirement\>	REQ-04.03-i4D-0010.0080	\<Partial\>
\<SATISFIES\>	\<ATMS Requirement\>	REQ-05.06.01-OSED-SG01.0400	\<Partial\>

3

4 [REQ]

Identifier	REQ-10.07.01-TS-3131.017
Requirement	When the AMIC verification procedure <u>fails</u>, the i4D Function **shall**: → discard the received downlink ADS/IC Data and → invoke the ADS user abort request primitive with the reason parameter set to UserAbortReason value "validation failure".
Title	i4D Function behaviour in an AMIC verification procedure failure
Status	\<Validated\>
Rationale	
Category	\<Functional\>
Validation Method	
Verification Method	\<Test\>

5

6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
\<APPLIES_TO\>	\<Operational Focus Area\>	OFA04.01.02	N/A
\<ALLOCATED_TO\>	\<Functional block\>	Air/Ground Datalink Comunications	N/A
\<SATISFIES\>	\<Enabler\>	ER APP ATC 119	\<Partial\>
\<SATISFIES\>	\<ATMS Requirement\>	REQ-04.03-i4D-0010.0080	\<Partial\>
\<SATISFIES\>	\<ATMS Requirement\>	REQ-05.06.01-OSED-SG01.0400	\<Partial\>

7

8 [REQ]

Identifier	REQ-10.07.01-TS-3131.018
Requirement	If the ADS-C message received in a downlink ADS/IC Data <u>cannot be successfully decoded</u> as an ADSReject, ADSNonCompliance or ADSReport, then the INITIAL 4D Function **shall**: → discard the received downlink ADS-C Message and → invoke the ADS user abort request primitive with the reason parameter set to UserAbortReason value "unable to decode message".
Title	I4D Function behaviour when a downlink ADS/IC Data cannot be successfully decoded
Status	\<Validated\>
Rationale	
Category	\<Functional\>
Validation Method	
Verification Method	\<Test\>

9

10 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
\<APPLIES_TO\>	\<Operational Focus Area\>	OFA04.01.02	N/A
\<ALLOCATED_TO\>	\<Functional block\>	Air/Ground Datalink Comunications	N/A

<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0080	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

1
2   [REQ]

Identifier	REQ-10.07.01-TS-3131.019
Requirement	After the aircraft ADS-C capabilities are known by the INITIAL 4D Function, the i4D function **shall** request to the Data-link Communication Layer the Establishment and Operation of the ADS-C Contracts, being: ✈ ADS Demand Contract; ✈ ADS Event Contract; ✈ ADS Periodic Contract;
Title	Establishment and Operation of the ADS-C Contracts
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

3
4   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0070	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0080	<Partial>
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

5
6   [REQ]

Identifier	REQ-10.07.01-TS-3131.020
Requirement	The INITIAL 4D Function **shall** support the following services: ✈ ADS-report Service; ✈ ADS-cancel Service; ✈ ADS-cancel-all-contracts Service; ✈ ADS-user-abort Service; ✈ ADS-provider-abort Service.
Title	Services supported by i4D Function
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

7
8   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Services	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0070	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0080	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

1

2 [REQ]

Identifier	REQ-10.07.01-TS-3131.021
Requirement	The INITIAL 4D Function **shall** support the emergency/urgency indicator.
Title	Emergency/urgency indicator
Status	<Validated>
Rationale	*Note 1: Timers and the timer values for the ADS-Contracts are part of the ATN-Stack (DL-FEP); no specific requirements for the INITIAL 4D Function are defined. The default technical timers used in the current Data Link (CPDLC) are also applied in ADS-C ATN and are 6 minutes.* *Note 2: For the first release of the INITIAL 4D function prototype no operational timers will be used*
Category	<Functional>
Validation Method	
Verification Method	<Test>

3

4 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.002	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0070	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0080	<Partial>
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

5

6 [REQ]

Identifier	REQ-10.07.01-TS-3131.022
Requirement	The INITIAL 4D Function **shall** support all the ADS-C uplink messages (UM) defined in [26]: ✈ ADS Periodic Contract; ✈ ADS Event Contract; ✈ ADS Demand Contract; ✈ ADS Cancel Contract.
Title	ADS-C uplink messages supported
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

7

8 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 119	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0070	<Full>
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

9

10 [REQ]

Identifier	REQ-10.07.01-TS-3131.023
Requirement	The INITIAL 4D Function **shall** support all the ADS-C downlink messages

	(DM) defined in [26]: ✈ ADS periodic report; ✈ ADS event report; ✈ ADS demand report; ✈ ADS positive acknowledgement; ✈ ADS non compliance notification; ✈ ADS reject notification.
Title	ADS-C downlink messages supported
Status	\<Validated\>
Rationale	
Category	\<Functional\>
Validation Method	
Verification Method	\<Test\>

1

2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
\<APPLIES TO\>	\<Operational Focus Area\>	OFA04.01.02	N/A
\<ALLOCATED TO\>	\<Functional block\>	Air/Ground Datalink Comunications	N/A
\<SATISFIES\>	\<Enabler\>	ER APP ATC 119	\<Partial\>
\<SATISFIES\>	\<ATMS Requirement\>	REQ-04.03-i4D-0010.0070	\<Full\>
\<SATISFIES\>	\<ATMS Requirement\>	REQ-04.03-i4D-0010.0080	\<Partial\>
\<ALLOCATED TO\>	\<Functional block\>	Air/Ground Datalink Service	N/A
\<SATISFIES\>	\<ATMS Requirement\>	REQ-04.05.00-OSED-F060-0010	\<Partial\>
\<SATISFIES\>	\<ATMS Requirement\>	REQ-04.05.00-OSED-F060-0030	\<Partial\>
\<SATISFIES\>	\<ATMS Requirement\>	REQ-05.06.01-OSED-SG01.0400	\<Partial\>
\<SATISFIES\>	\<ATMS Requirement\>	REQ-05.06.01-OSED-SG02.0200	\<Partial\>
\<SATISFIES\>	\<ATMS Requirement\>	REQ-04.05.00-OSED-F060-0040	\<Partial\>

3

4 [REQ]

Identifier	REQ-10.07.01-TS-3131.024
Requirement	The INITIAL 4D Function **shall** support all the optional and mandatory fields of ADS-C messages defined (i.e. excluding the red ones) in the 9.1 D2 [26] as well as variable, range and resolution.
Title	Optional and mandatory fields of ADS-C messages supported
Status	\<Validated\>
Rationale	
Category	\<Functional\>
Validation Method	
Verification Method	\<Test\>

5

6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
\<APPLIES_TO\>	\<Operational Focus Area\>	OFA04.01.02	N/A
\<ALLOCATED_TO\>	\<Functional block\>	Air/Ground Datalink Comunications	N/A
\<SATISFIES\>	\<Enabler\>	ER APP ATC 119	\<Partial\>
\<SATISFIES\>	\<ATMS Requirement\>	REQ-04.03-i4D-0010.0070	\<Partial\>
\<SATISFIES\>	\<ATMS Requirement\>	REQ-04.03-i4D-0010.0080	\<Partial\>
\<SATISFIES\>	\<ATMS Requirement\>	REQ-05.06.01-OSED-SG01.0400	\<Partial\>

7

8 [REQ]

Identifier	REQ-10.07.01-TS-3131.025
Requirement	The INITIAL 4D Function **shall** support the set-up/definition (as system wide applicable configuration parameters) of the content of the EPP Periodic Contract as defined in the 9.1 D2 [26] and detailed in the SPR/INTEROP Version H interim standard [1], [2].

Title	Set-up/definition of the content of the EPP Periodic Contract supported
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

1
2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0040	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F060-0030	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

3
4 [REQ]

Identifier	REQ-10.07.01-TS-3131.026
Requirement	The INITIAL 4D Function **shall** support the set-up/definition (as system wide applicable configuration parameters) of the content of the EPP Reporting Window as part of the ADS-C Periodic Contract as defined in the 9.1 D2 [26] and detailed in the SPR/INTEROP Version H interim standard [1], [2].
Title	Set-up/definition of the content of the EPP Reporting Window as part of the ADS-C Periodic Contract
Status	<Validated>
Rationale	*Note: The EPP Monitoring Window and EPP Reporting Window are using the EPP Window for their definition, which is defined as periods of 15 minutes*
Category	<Functional>
Validation Method	
Verification Method	<Test>

5
6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F060-0030	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0040	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

7
8 [REQ]

Identifier	REQ-10.07.01-TS-3131.027
Requirement	The INITIAL 4D Function **shall** support the automatic cancellation of the EPP Periodic Contract (as part of the ADS-Cancel-All-Contracts) for each specific flight, being: → when the flight is no longer under control of a C-ATSU controller (triggered by the last Cancel Assume or last uplinked "CONTACT" message); → when the flight plan of the specific flight is cancelled. *Note: both the cancelation of the EPP Periodic Contract and EPP Event Contract are cancelled in one "ADS-Cancel-All-Contracts".*
Title	Automatic cancellation of the EPP Periodic Contract
Status	<Validated>

Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

1
2 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

3
4 [REQ]

Identifier	REQ-10.07.01-TS-3131.028
Requirement	The INITIAL 4D Function **shall** support the set-up/definition (as system wide applicable configuration parameters) of the content of the EPP Event Contract as defined in the 9.1 D2 [26] and detailed in the SPR/INTEROP Version H interim standard [1], [2].
Title	Set-up/definition of the content of the EPP Event Contract
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

5
6 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0040	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F060-0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

7
8 [REQ]

Identifier	REQ-10.07.01-TS-3131.029
Requirement	The INITIAL 4D Function **shall** support the set-up/definition (as system wide applicable configuration parameters) of the content of the EPP Reporting Window as part of the ADS-C Event Contract as defined in the 9.1 D2 [26] and detailed in the SPR/INTEROP Version H interim standard [1], [2].
Title	Set-up/definition of the content of the EPP Reporting Window as part of the ADS-C Event Contract
Status	<Validated>
Rationale	*Note: The EPP Monitoring Window and EPP Reporting Window are using the EPP Window for their definition, which is defined as periods of 15 minutes*
Category	<Functional>
Validation Method	
Verification Method	<Test>

9
10 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0040	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F060-0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

1

2 [REQ]

Identifier	REQ-10.07.01-TS-3131.030
Requirement	The INITIAL 4D Function **shall** support the set-up/definition (as system wide applicable configuration parameters) of the EPP Monitoring Window as part of the ADS-C Event Contract as defined in the 9.1 D2 [26] and detailed in the SPR/INTEROP Version H interim standard [1], [2].
Title	Set-up/definition of the EPP Monitoring Window as part of the ADS-C Event Contract
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

3

4 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0040	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F060-0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

5

6 [REQ]

Identifier	REQ-10.07.01-TS-3131.031
Requirement	The INITIAL 4D Function **shall** support the RTA Missed data.
Title	RTA Missed data
Status	<Validated>
Rationale	*Note 1: in the i4D concept the "RTA Missed' announcement shall not be automated, but be only a trigger to the pilot, it is a pilot's responsibility to announce the "RTA Missed", in cases where it is assessed as important information for ATC, or e.g. he will try to achieve the RTA by overriding certain pre-programmed limitations by manual control* *Note 2: In the i4D scope the forwarding to the CWP of the RTA Missed can be considered to be provision for the future only.*
Category	<Functional>
Validation Method	
Verification Method	<Test>

7

8 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
<SATISFIES>	<Enabler>	ER APP ATC 149c	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0020.0100	<Partial>
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG07.0300	<Partial>

9

10 [REQ]

Identifier	REQ-10.07.01-TS-3131.032

Requirement	The INITIAL 4D Function **shall** support the automatic cancellation of the EPP Event Contract (as part of the ADS-Cancel-All-Contracts) for each specific flight, being:
	✈ when the flight is no longer under control of a C-ATSU controller (triggered by the last Cancel Assume or last uplinked "CONTACT" message);
	✈ when the flight plan of the specific flight is cancelled.
Title	Automatic cancellation of the EPP Event Contract
Status	<Validated>
Rationale	*Note 1: For the trials and validations this functionality will not be used by the controllers, to allow collecting ADS-C data beyond the boundaries of C-ATSU.*
	Note 2: both the cancelation of the EPP Periodic Contract and EPP Event Contract are cancelled in one "ADS-Cancel-All-Contracts".
Category	<Functional>
Validation Method	
Verification Method	<Test>

1
2   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0020.0010	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.002	<Partial>
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

3
4   [REQ]

Identifier	REQ-10.07.01-TS-3131.033
Requirement	The INITIAL 4D Function **shall** support the REJECT message from the aircraft, including the provided details specifying the reason.
Title	REJECT message
Status	<Validated>
Rationale	*Note: The Reject Reasons will be displayed on the HMI.*
Category	<Functional>
Validation Method	
Verification Method	<Test>

5
6   [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES_TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG01.0400	<Partial>

7
8   [REQ]

Identifier	REQ-10.07.01-TS-3131.034
Requirement	The INITIAL 4D Function **shall** provide the controller the option to ask for a

	specific flight on a specific waypoint the ETA min/max
Title	ETA min/max on a specific waypoint asked by the controller
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Comunications	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Services	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0070	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG5a.0400	<Partial>

[REQ]

Identifier	REQ-10.07.01-TS-3131.035
Requirement	The INITIAL 4D Function **shall** support an ETA min/max request uplink via the *ADS-C Demand Contract.*
Title	ETA min/max request uplink via the *ADS-C Demand Contract*
Status	<Validated>
Rationale	*Note 1: The request for an ETA min/max will result in an automatic deletion of the RTA active in the aircraft*
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Communications	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.05.01-OSED-0511.006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0070	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F070-0010	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F070-0020	<Full>
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Service	N/A
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG5a.0400	<Partial>

[REQ]

Identifier	REQ-10.07.01-TS-3131.036
Requirement	The INITIAL 4D Function **shall** make the received ETA min/max available to the controller.
Title	ETA min/max available to the controller
Status	<Validated>
Rationale	
Category	<Functional>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Communications	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Services	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149b	<Partial>

<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F070-0040	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0010.0080	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-05.06.01-OSED-SG5a.0400	<Partial>

1

2 [REQ]

Identifier	REQ-10.07.01-TS-3131.037
Requirement	The INITIAL 4D Function **shall** perform a 2D (or lateral) check on the received ADS-C EPP by comparing it with the Flight Plan as available in i4D FDPS.
Title	EPP 2D check
Status	<Validated>
Rationale	*Note-1: for this 2D comparison the route between two waypoints can be considered to be straight line, e.g. no specific curved bends need to be considered.* *Note-2: The 2D (or lateral) check as described above are based on a pre-defined (configuration parameter) distance (default value 2 NM)*
Category	<Functional>
Validation Method	
Verification Method	<Test>

3

4 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<ALLOCATED_TO>	<Functional block>	Air/Ground Datalink Services	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
< SATISFIES>	< ATMS Requirement>	REQ-05.06.01-OSED-SG02.0300	<Partial>

5

6 [REQ]

Identifier	REQ-10.07.01-TS-3131.038
Requirement	After the performance of the 2D consistency check, the INITIAL 4D Function **shall** inform CWP the result, in order to manage the warning indicator.
Title	Route discrepancy warning management
Status	<Validated>
Rationale	If a 2D route inconsistency is detected, the controller is warned. When the discrepancy is solved, the warning must be removed.
Category	<Functional>
Validation Method	
Verification Method	<Test>

7

8 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<APPLIES TO>	<Operational Focus Area>	OFA04.01.02	N/A
<SATISFIES>	<Enabler>	ER APP ATC 149a	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.03-i4D-0020.0040	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-04.05.00-OSED-F060-0090	<Full>
<ALLOCATED TO>	<Functional block>	Air/Ground Datalink Service	N/A

9

10

11 3.2 Adaptability

12 3.3 Performance Characteristics

13 N/A

14 3.4 Safety & Security

15 N/A

3.5　Maintainability

N/A

3.6　Reliability

N/A

3.7　Functional block Internal Data Requirements

N/A

3.8　Design and Construction Constraints

N/A

3.9　Functional block Interface Requirements

N/A

4 Assumptions

N/A

5 References

RTCA/EUROCAE documents

Pending approval of final draft by WG78/SC214 and publication by EUROCAE, teh following references should be used:

[1] Data Communications Safety and Performance Requirements (SPR) version H
[2] Advanced ATS datalink services INTEROP version H
[3] PMADS ADS-C application (Protected Mode V07 – Version H)
[4] PMFIS-V1.5(03FEB10)-H-clean.doc
[5] 4DTRAD Operational Service Description

Note: These documents can be downloaded from the following website:
http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_comms_services/sc214/current_docs/

ARINC Document: (http://www.arinc.com/)
[6] ARINC Characteristic 702A-3: Advanced Flight Management System, Dec 6, 1996

WP10.7.1 Documents:
[7] 10.07.01-PIR-Part_1-00.02.01_250610_Final.doc
[8] 10.07.01–D02 _AGDL System Requirements - Phase 1.doc
[9] 10.7.1 – D87 AGDL System Requirements - TS 2014
[10] 10.7.1.D54 - Initial ATN IPS Technical Feasibility report

Documents from Ops Projects:
[11] 04.03 04.03-D07-IOP OSED and Requirements - Part 1 OSED.doc, 31/05/2011
[12] 04.03-D111-i4D+CTA Validation Report- Step A.doc, Edition 00.01.02 date 03/05/2012
[13] 04.03-D62-i4D+CTA Validation Report- Step B.doc, Edition 00.01.00, date 24/05/2013
[14] 04.03-D61-i4D+CTA Validation Plan - Step B.doc, Edition 00.02.01, Date 08/11/2012
[15] 04.03-D63 Part A -i4D+CTA VP-463 Validation Plan - Step C.DOC, Edition 00.01.00, Date 26/07/2013
[16] 04.03-D63 Part B-i4D+CTA VP-472 Validation Plan - Step C.DOC, Edition 00.01.00, Date 26/07/2013
[17] 04.03-D64-i4D+CTA Validation Report - Step C.doc
[18] 04.03-D104-i4D+CTA Validation Plan – Step A.doc
[19] 05.06.01-D74- Step 1 OSED - Iteration 3.doc, Edition 01.00.00, date 11/09/2013
[20] 05.06.01-M196- Step 1 SPR - Iteration 3.doc, Edition 00.01.00, date 09/04/2014
[21] 06.07.02-D73- Preliminary OSED for advanced surface routing.doc, Edition 00.01.02, date 12/08/2014
[22] 06.07.03-D22- Preliminary OSED and Preliminary Operational Procedures development Phase 2.doc, Edition 00.01.01, date 11/11/2013
[23] 05.06.01-D082-EXE-05.06.01-VP-478 Validation Report, Edition 00.01.00, date 30/06/2014.
[24] 05.06.01-D081-EXE-05.06.01-VP-478 Validation Plan, Edition 00.02.01, date 30/01/2014

Others WP9.X Documents:

[25] 09.01.D01-Aircraft_and_System_Peformance_and_Functional_requirements_-step_1_(WA1).doc

[26] SESAR WP9.1 D2 aircraft _ATC systems Interface.doc

[27] ASPA SM D9.05-001 issue1

[28] ASPA SM D9.05-005 issue1

[29] 9.13.D01_Airport_Surface_Taxi_Clearance_Functional_Requirement_Document.doc

[30] 9.33 D01 WA1 "Aircraft functional definition assumption – release 1

[31] 9.33 D02 WA2.1 Technical note on avionic system definition

SC214 / WG78 CSG Bugzilla

[32] https://sc214wg78.egis-avia.fr/csg/query.cgi

SESAR documents:

[33] Template Toolbox 03.00.00
https://extranet.sesarju.eu/Programme%20Library/SESAR%20Template%20Toolbox.dot

[34] Requirements and V&V Guidelines 03.00.00
https://extranet.sesarju.eu/Programme%20Library/Requirements%20and%20VV%20Guidelines.doc

[35] Templates and Toolbox User Manual 03.00.00
https://extranet.sesarju.eu/Programme%20Library/Templates%20and%20Toolbox%20User%20Manual.doc

[36] EUROCONTROL ATM Lexicon
https://extranet.eurocontrol.int/http://atmlexicon.eurocontrol.int/en/index.php/SESAR

[37] SESAR Definition Phase – Task 2.4.x Milestone 3 – System Architecture (DLT-0612-244-00-10), September 2007

1 Appendix A   CPDLC and ADS-C Applicable Messages

2 A.1   CPDLC and ADS-C messages set to support i4D
3   Validation

4 The following excel sheet represents the supported interface between aircraft and ATC systems to
5 enable I4D validation. It represents the data that will be provided and supported by P10.07.01 and
6 WP9.1airborne systems (mainline and regional).

SESAR SWP9 1
ircraft _ATC sys.

7

8 The terms in the table below are used to define 9.1 status on datalink items:

Will be supported :	Implemented/tested/validated in WP9.1 Step 1
Not supported	Topic out of scope for the foreseen WP9.1 Step 1 validations,
Available but not used in 9.1	As WP9.1 airborne ATSU prototype is common with WP9.33, Some CPDLC messages will be available, but will not be validated nor used in WP9.1
N/A (Not applicable):	No direct status can be performed. Used when it is a generic parameter that is used in other messages.The status is provided in the relevant containing message.

9 Maximum compliance with the SC214/WG78 on I4D related messages is targeted. The basic
10 assumptions are the following:

11   -   CPDLC Speed schedule and speed change messages are not considered to be part of
12   WP9.1 Step 1 validations.

13   -   Trajectory Negotiations via Data Link are not considered to be part of WP9.1 Step 1
14   validations.

15   -   Ground-ground coordination infrastructure will not be available in the timeframe of WP9.1
16   Step 1 validations and will as such not be part of the WP9.1 Step 1 validations.

17   -   CPDLC "EXPECT" messages are not part of the WP9.1 Step 1 validations.

18   -   ADS-C downlinked Met data are not part of the WP9.1 Step 1 validations

19

20 A.2   CPDLC messages set to support D-TAXI Validation

21 *Note*: The CPDLC message set presented below is the one proposed by the WG78 in the SPR (ref
22 [2]) but not validated yet (for example, there seems to be too much flexibility allowed for proper
23 handling on board). This list is not exhaustive but represents the most used messages during D-TAXI
24 operations: it contains D-TAXI messages specific to the function and CPDLC messages common with
25 other datalink functions.

26

UM#	Message content	Description	Standard Revision
0	UNABLE	Basic PAM (Pilot Acknowledgement Messages)	H,I
1	STANDBY		H,I

UM#	Message content	Description	Standard Revision
159	ERROR [*error information*]	A system generated message notifying that the ground system has detected an error.	H,I
162	MESSAGE NOT SUPPORTED BY THIS ATS UNIT	Notification that the ground system does not support this message.	H,I
164	WHEN READY	The associated instruction may be complied with at any future time.	H,I
168	DISREGARD	The indicated communication should be ignored.	H,I
177	AT PILOTS DISCRETION	Used in conjunction with a clearance/instruction to indicate that the pilot may execute when prepared to do so.	H,I
183	Free text		H,I
218	REQUEST ALREADY RECEIVED	Indicates to the pilot that the request has already been received on the ground.	H,I
227	LOGICAL ACKNOWLEDGMENT	Confirmation to the aircraft system that the ground system has received the message to which the logical acknowledgment refers and found it acceptable for display to the responsible person.	H,I
311	STARTUP APPROVED	Instruction to hold the current position	H,I
312	CANCEL STARTUP	Instruction to cancel engine startup.	H,I
313	PUSH BACK APPROVED [pushback information] [assigned time]	Instruction to commence pushback at the specified location in the specified direction at the specified time.	H,I
314	EXPECT [clearance type] [assigned time]	Notification that the specified clearance type may be issued to meet the specified	H,I
315	EXPECT TAXI [taxi route]	Notification that a taxi clearance may be issued for the specified taxi route.	H,I
316	WHEN CAN YOU ACCEPT [clearance type]	Request for the earliest time at which the specified clearance can be accepted.	H,I
318	CROSS [position information]	Instruction to cross the specified location.	H,I
319	TAXI [taxi route]	Instruction to taxi to the specified location.	H,I
320	RUNWAY [runway] TAXI [taxi route]	Instruction to taxi to the specified location with a hold short position.	H,I
322	HOLD POSITION	Instruction to hold the current position	H,I
323	FOR DE ICING	Indication that the associated instruction is issued in order to perform de-icing.	H,I

UM#	Message content	Description	Standard Revision
324	CAN YOU ACCEPT INTERSECTION [positionInformation] FOR DEPARTURE RUNWAY [runway]	Request to indicate whether or not the specified intersection can be accepted on the specified departure runway.	H
324	CAN YOU ACCEPT INTERSECTION [intersection] FOR DEPARTURE RUNWAY [runway]	Request to indicate whether or not the specified intersection can be accepted on the specified runway.	I
325	REVISED	Indication that the associated instruction is either a revision to a previously issued instruction or is different from the requested route/oceanic clearance.	H
325	REVISED [revision reason]	Indication that the associated instruction is either a revision to a previously issued instruction or. is different from the request ed clearance.	I
328	[distance ground] AVAILABLE	Indicates the remaining length of the runway for an intersection departure	H,I
329	INTERSECTION DEPARTURE [intersection]	Indicates the intersection departure for a taxi clearance or taxi route information.	H,I
333	HOLD SHORT [ground positionR]	Instruction to hold short of the specified position	H,I

1   Table 4: D-TAXI CPDLC Uplink Message Set

2

DM#	Message content	Justification	Standard Revision
0	WILCO		H,I
1	UNABLE	Basic PAM (Pilot Acknowledgement Messages)	H,I
2	STANDBY		H,I
3	ROGER		H,I
25	REQUEST [clearance type] CLEARANCE	clearanceType = Start-up, Pushback, Taxi, Departure. At this stage: not envisaged (by WG-78) for Line-up, Take-off	H,I
62	ERROR [error information]	A system-generated message that the avionics has detected an error.	H,I
65R 66R	DUE TO [due to reason]	Indication of the reason for the associated message.	H,I
97	Free text		H,I
98	Free text		H,I

DM#	Message content	Justification	Standard Revision
100	LOGICAL ACKNOWLEDGMENT	Confirmation to the ground system that the aircraft system has received the message to which the logical acknowledgment refers and found it acceptable for display to the responsible person.	H,I
108	DE-ICING COMPLETE	Notification that de-icing action has been completed	H,I
140	DE-ICING STARTED	Notification that de-icing has started.	H,I
141	FOR DE-ICING	Indication that the associated request is issued in order to perform de-icing.	H,I
142	ABLE INTERSECTION [intersection] RUNWAY [runway]	Specifies the intersection for the specified departure runway in a taxi request.	H
142	WE CAN ACCEPT INTERSECTION [intersection] FOR DEPARTURE RUNWAY [runway]	Specifies the intersection for the specified departure runway in a taxi request.	I
143	READY FOR [clearance typeR] [assigned time]	Indication that the aircraft will be ready for the specified clearance at the time required to meet the specified time.	H,I
145	CANCELLING STARTUP	Indication the aircraft is cancelling startup.	H,I
146	REQUEST PUSH BACK [pushback information [assigned time]	Request from flight crew to push back from indicated position in specified direction and optionally at specified time.	H
146	REQUEST PUSH BACK [pushback location]	Request to push back from the specified position in specified direction.	I
147	REQUEST DE-ICING [position information]	Request for de-icing and may include an optional location.	H,I
148	NO DE-ICING REQUIRED	Indication that de-icing is not required.	H,I
149	REQUEST EXPECTED TAXI ROUTING [taxi location]	Request for taxi routing information; may sepcify the taxi start position.	H,I
150	REQUEST TAXI [taxi request data]	Request for taxi clearance to/from the specified position.	H,I
151	REQUEST TAXI UPDATE [position information]	Request for continued taxi clearance when about to reach or after having reached a holding position. It is a High Alert because the aircraft is in a movement area.	H,I
152	WITH [number of engines] ENGINES START	Indication that the movement of the aircraft will be slightly delayed.	H,I
153	REVISED	Update of previous information.	H,I

1   Table 5: D-TAXI CPDLC Downlink message set

2

3

Appendix B   PDRs List for i4D

The document below is about the PDR to be implemented in the INITIAL 4D Function in the scope of the SESAR i4D Project (agreement between P9.1, P9.33, P4.3 and P10.7.1).

WG78 PDR_for_i4D
20110131.doc

Note: the PDRs as raised under EUROCAE WG78/RTCA-SC214 via the dedicated sub-group CSG and which are accessible Bugzilla via https://sc214wg78.egis-avia.fr/csg/.

Appendix C   Gap Analysis

Herein are described the main differences, for the function, between the implemented messages set, based on SC214/WG78 INTEROP issue H [2], and the 1st official release **Erreur ! Source du renvoi introuvable.** and assesses their impacts on the prototypes.

A similar analysis is done between SPR issue H [3] [4] **Erreur ! Source du renvoi introuvable.**, applied by the prototype, and the 1st official release **Erreur ! Source du renvoi introuvable.**.

C.1 SPR Impacts

The analysis has performed on the following datalink application:

- ADS-C,
- CPDLC;

And the following services:

- CM, DLIC, ACM, AMC, ACL, CRD, IER, ITP, 4DTRAD, DCL, D-TAXI, IM.

In the following table are described the changes and their impacts on prototypes.

Chg id	App	Services	Ref. Rev Initial	Change Description	Summary	Prototype impacts
1	CM	N/A		DLIC Update Function Operating Method has been removed in Rev Initial		
2	CM	N/A	Step 4S in Table 4-1	Step 4S in Table 4-1 in Rev Initial considers even the case in which the requested information is not known, in which case ground system sends an initiation response to the aircraft including CM information for the specified ATSU and send a DLIC contact request for the specified ATSU		YES
3	CM	DLIC		Following text added in the DLIC service overview in Rev Initial :"The DLIC service provides the capability to determine the compatibility of aircraft and ATSU systems, and may be used to correlate information between the aircraft and ATSU flight plan."		
4	CM	DLIC		In Rev 0.H iti is said that DLIC ATSU ground addresses are published in State AIPs, while in Rev Initial it is said that they can be even published in the ICAO registry document(s)		YES
5	CM	DLIC	DLIC-OR 1 and DLIC-OR 2	In Rev Initial requirements DLIC-OR 1 and DLIC-OR 2 only logon is mentioned no reference to Update, as		

Chg id	App	Services	Ref. Rev Initial	Change Description	Summary	Prototype impacts
				reported in Rev 0.H DLIC-OR 5		
6	CM	DLIC		Requirement DLIC-OR 8 from Rev 0.H, related to time to respond to a contract request has been deleted in Rev Initial		
7	CM	DLIC		Requirement DLIC-OR 9 from Rev 0.H, related to provision of flight plan information to DLIC ground system by a certified source has been removed in Rev Initial		
8	CM	DLIC		Requirements DLIC-OR 12 and DLIC-OR 13 from Rev 0.H have been removed from Rev Initial		
9	CM	DLIC	DLIC-OR 7,	Requirement DLIC-OR 7, related to aircraft retrieving of DLIC information by ground station and sending right DLIC information, has been added in Rev Initial		
10	CM	DLIC		In Rev Initial Update function has been removed respect to Rev 0.H		
11	CPDLC	ACM		ACM service moved from under CPDLC application section in Rev 0.H to ATC services Chapter (Section3) in Rev Initial	1. Message ids changed (UM272 instead of UM287, UM273 instead of UM286, UM271 instead of UM285, UM301 instead of UM340) 2. Requirements on prohibition from checking latency on system management messages have been added for both ATSU	YES
12	CPDLC	ACM		Requirements ACM-OR 1 and ACM-OR 2 from Rev 0.H have been deleted in Rev Initial. ACM-OR 3 of Rev 0.H is ACM-OR 1 in Rev Initial and so on		
13	CPDLC	ACM	ACM-OR 4, ACM-OR 5 ACM-OR 6	In ACM-OR 4, ACM-OR 5 and ACM-OR 6 in Rev Initial CPDLC messages changed respect to Rev 0.H. UM272 instead of UM287, UM273 instead of UM286, UM271 instead of UM285		
14	CPDLC	ACM	ACM-OR 6	In ACM-OR 6 of Rev Initial no indication of latency value is required respect to Rev 0.H where an UM340 message is foreseen		
15	CPDLC	ACM	ACM-OR 7	ACM-OR 7 added in Rev Initial		
16	CPDLC	ACM	ACM-OR 8	ACM-OR 8 of Rev Initial corresponds to ACM-OR 9		

Chg id	App	Services	Ref. Rev Initial	Change Description	Summary	Prototype impacts
				of Rev 0.H. Message used changed from UM340 to UM301	and Aircraft systems 3. Requirements on DLIC as a prerequisite have been removed, but this has been specified in the overview section	
16	CPDLC	ACM	ACM_OR_09	ACM-OR 10 and ACM-OR 11 from Rev 0.H deleted in Rev Initial. ACM-OR 12 from Rev 0.H corresponds to ACM-OR 09 in Rev Initial and so on		
17	CPDLC	ACM	ACM-OR 12	ACM-OR 12 added in Rev Initial		
18	CPDLC	AMC		The description of the two ways in which the AMC service can be provided (addressed or broadcast) has been removed in the Rev Initial		NO
19	CPDLC	AMC		AMC-OR 1 requirement removed in Rev Initial. It is about ACM being a prerequisite for AMC, which in Rev Initial is reported in the Overview Section		
20	CPDLC	4DTRAD		The following Rev 0.H requirements don't match any more with Rev Initial: 4DTRAD-OR 1 4DTRAD-OR 2 4DTRAD-OR 7 4DTRAD-ORec 1 4DTRAD-OR 9 4DTRAD-OR 12 4DTRAD-OR 17 4DTRAD-OR 18 4DTRAD-OR 19 4DTRAD-OR 21 4DTRAD-OR 23 4DTRAD-OR 27 4DTRAD-OR 29 4DTRAD-OR 35 4DTRAD-OR 36 4DTRAD-OR 37 4DTRAD-OR 38 4DTRAD-OR 39 4DTRAD-OR 41	No changes	NO
21		4DTRAD	4DTRAD-OR 2	The Rev initial requirements match with rev 0.h 4DTRAD-OR 3		
22		4DTRAD	4DTRAD-	The Rev initial		

Chg id	App	Services	Ref. Rev Initial	Change Description	Summary	Prototype impacts
			OR 2; 4DTRAD-OR 3	requirements match with rev 0.h 4DTRAD-OR 4		
23		4DTRAD	4DTRAD-OR 4	The Rev initial requirements match with rev 0.h 4DTRAD-OR 5		
24		4DTRAD	4DTRAD-OR 5	The Rev initial requirements match with rev 0.h 4DTRAD-OR 6		
25		4DTRAD	4DTRAD-OR 6	The Rev initial requirements match with rev 0.h 4DTRAD-OR 8		
26		4DTRAD	4DTRAD-OR 7	The Rev initial requirements match with rev 0.h 4DTRAD-OR 10		
27		4DTRAD	4DTRAD-OR 7	The Rev initial requirements match with rev 0.h 4DTRAD-OR 11		
28		4DTRAD	4DTRAD-OR 8	The Rev initial requirements match with rev 0.h 4DTRAD-OR 13		
29		4DTRAD	4DTRAD-OR 21	The Rev initial requirements match with rev 0.h 4DTRAD-OR 14		
30		4DTRAD	4DTRAD-OR 8; 4DTRAD-ORec 1	The Rev initial requirements match with rev 0.h 4DTRAD-OR 15		
31		4DTRAD	4DTRAD-OR 13	The Rev initial requirements match with rev 0.h 4DTRAD-OR 16		
32		4DTRAD	4DTRAD-OR 21	The Rev initial requirements match with rev 0.h 4DTRAD-OR 20		
33		4DTRAD	4DTRAD-OR 13	The Rev initial requirements match with rev 0.h 4DTRAD-OR 22		
34		4DTRAD	4DTRAD-OR 11	The Rev initial requirements match with rev 0.h 4DTRAD-OR 24		
35		4DTRAD	4DTRAD-OR 11	The Rev initial requirements match with rev 0.h 4DTRAD-OR 25		
36		4DTRAD	4DTRAD-OR 1; 4DTRAD-OR 12; 4DTRAD-OR 13	The Rev initial requirements match with rev 0.h 4DTRAD-OR 26		
37		4DTRAD	4DTRAD-OR 1; 4DTRAD-OR 14; 4DTRAD-OR 15	The Rev initial requirements match with rev 0.h 4DTRAD-OR 28		

Chg id	App	Services	Ref. Rev Initial	Change Description	Summary	Prototype impacts
38		4DTRAD	4DTRAD-OR 1; 4DTRAD-OR 14; 4DTRAD-OR 15	The Rev initial requirements match with rev 0.h 4DTRAD-OR 30		
39		4DTRAD	4DTRAD-OR 16; 4DTRAD-OR 17	The Rev initial requirements match with rev 0.h 4DTRAD-OR 31		
40		4DTRAD	4DTRAD-OR 18; 4DTRAD-OR 19	The Rev initial requirements match with rev 0.h 4DTRAD-OR 32		
41		4DTRAD	4DTRAD-OR 18; 4DTRAD-OR 19	The Rev initial requirements match with rev 0.h 4DTRAD-OR 33		
42		4DTRAD	4DTRAD-OR 20; 4DTRAD-OR 21	The Rev initial requirements match with rev 0.h 4DTRAD-OR 34		
43		4DTRAD	4DTRAD-OR 1; 4DTRAD-OR 12; 4DTRAD-OR 13	The Rev initial requirements match with rev 0.h 4DTRAD-OR 43		
44		4DTRAD	4DTRAD-OR 13	The Rev initial requirements match with rev 0.h 4DTRAD-OR 52		
45		4DTRAD	4DTRAD-OR 13	The Rev initial requirements match with rev 0.h 4DTRAD-OR 53		
46		4DTRAD	4DTRAD-OR 13	The Rev initial requirements match with rev 0.h 4DTRAD-OR 54		
47		4DTRAD	4DTRAD-OR 13	The Rev initial requirements match with rev 0.h 4DTRAD-OR 55		
48		4DTRAD	4DTRAD-OR 21	The Rev initial requirements match with rev 0.h 4DTRAD-OR 60		
49		4DTRAD	4DTRAD-OR 13; 4DTRAD-OR 17	The Rev initial requirements match with rev 0.h 4DTRAD-OR 66		
50		4DTRAD	4DTRAD-OR 18; 4DTRAD-OR 19	The Rev initial requirements match with rev 0.h 4DTRAD-OR 67		
51		4DTRAD	4DTRAD-OR 12; 4DTRAD-OR 13;	Out Of scope, applicable to aircraft domain		

Chg id	App	Services	Ref. Rev Initial	Change Description	Summary	Prototype impacts
			4DTRAD-OR 16; 4DTRAD-OR 17			
52		4DTRAD	4DTRAD-OR 14; 4DTRAD-OR 15	Out Of scope, applicable to aircraft domain		
53	CPDLC	CRD	CRD-OR 1 CRD-OR 2 CRD-OR 3 CRD-OR 4	ACL is replaced by CRD and CRD operations reference now CPDLC operating methods for both dowlink and uplink messages (table5-1 & 5-2)		YES
54	CPDLC	IER	IER-OR 1 IER-OR 2 IER-OR 3 IER-OR 4 IER-OR 5 IER-OR 5 IER-OR 6 IER-OR 7 IER-OR 8 IER-OR 9 IER-OR 10 IER-OR 11 IER-OR 12 IER-OR 13 IER-OR 14	IER was not really existing as a service in rev 0.H, it was embedded in CPDLC messages requirement. Now the IER service coherent with previous Oceanic SPR reference CPDLC operating methods for both dowlink and uplink messages (tables 5-1, 5-2, 5-3 and 5-4) and ADS-C operating methods (tables 6-1, 6-2, 6-3, 6-4 and 6-5)		YES
55	CPDLC	ITP	ITP-OR 1 ITP-OR 2 ITP-OR 3 ITP-OR 4 ITP-OR 5	ITP is a completly new service compared to rev 0.H		YES
56	CPDLC	IM	IM-OR-1 IM-OR-2 IM-OR-3 IM-OR-4	IM is a new service not present in Rev 0.H.		YES
57	CPDLC	DCL	DCL-OR 1 DCL-OR 2 DCL-OR 3 DCL-OR 4 DCL-OR	Main changes are: • No more possible to append DTAXI message to DCL message • Added the following note: when a message is handled by the ATSU automation, the		YES

Chg id	App	Services	Ref. Rev Initial	Change Description	Summary	Prototype impacts
			5 DCL-OR 6	controller may not have a real time notification, but the controller will always be able to review a history of automated message traffic. • Added "Affirm" DM3 response in down link. • Added "Roger" DM4 response in down link.		
58	CPDLC	DTAXI	D-TAXI-OR 1 D-TAXI-OR 2 D-TAXI-OR 3 D-TAXI-OR 4 D-TAXI-OR 5	• Added the following note: when a message is handled by the ATSU automation, the controller may not have a real time notification, but the controller will always be able to review a history of automated message traffic. • Added "Affirm" DM3 response in down link.		YES

1

C.2 Comparison ATN Baseline 2 Draft H and Revision A Initial

ATN Baseline 2 Draft H has been used widely during the SESAR projects. ATN Baseline 2 Revision A is the latest version, published in March 2016. This note, produced in the context of SESAR project 10.07.01 looks briefly at the differences between the two.

For brevity, the versions will be referred to in this document as H, or Draft H, and A, or Revision A. The focus of attention will be the ASN-1 descriptions of the message sets. Revision A contains two versions of the message sets for CPDLC and ADS-C. Revision A, in section 2.1.3 of ED-231A, mentions that:

Ground implementations will use CPDLC Version 3 and ADS-C Version 2 when either DRNP or IM is required in the associated airspace.

NOTE: Ground implementations will select the set of data link services required in the associated airspace.

Two airborne implementations are foreseen:

- *An implementation supporting all B2 data link services using CPDLC Version 3 and ADS-C Version 2; and*

- *An implementation supporting all B2 data link services except DRNP and IM using CPDLC Version 2 and ADS-C Version 1.*

For brevity this note will look at ADS-C Version 2

C.2.1   Sources

Draft H was available for a while for download from the FAA website. This is no longer available but the author refers to a copy retrieved in 2014. The focus of the work is the Interop, and this version is dated 3rd Feb 2010. The draft H Interop is split into four volumes and each exists "redline" and a "clean" version. The "clean" version of volume 4 has been used. This contains Appendix A, the message definition. (Appendix A appears as section 7, for some reason)

Revision A has been published in March 2016. It is available for purchase from the EUROCAE website. The whole standard is contained in four volumes; ED-228A, ED-229A, ED-230A and ED-231A. This work focusses on ED-229A, the "INTEROPERABILITY REQUIREMENTS STANDARD FOR BASELINE 2 ATS DATA COMMUNICATIONS (BASELINE 2 INTEROP STANDARD)" and particularly on section 5, the message definitions.

C.2.2   Method

The core of the interop is broken into sections and each is expressed in ASN-1[1]. This document quickly compares the ASN-1 to point out significant differences. References are made for further reading as this document is no substitute for looking at the standards themselves. This document presents only the differences, not the whole content.

The interested reader could use freely available tools to convert the ASN-1 definitions into XSD, for which many graphical viewers exist.

The sections of the two documents are shown in the following table

Topic	Draft H	Revision A
CPDLC MESSAGE SET	7-2	5.2 – for version 3
DATIS MESSAGE SET	7-69	Not present
METAR MESSAGE SET	7-85	Not present
NOTAM MESSAGE SET	7-95	Not present
OTIS MESSAGE SET	7-101	Not present
VOLMET MESSAGE SET	7-102	Not present
AIB MESSAGE SET	7-104	Not present
D-RVR MESSAGE SET	7-106	Not present
ADS-C MESSAGE SET	7-109	5.4 – for version 2

Table 6 Message set definitions within the versions

---

[1] ASN-1. See Wikipedia. ASN-1 is a serialization notation.

C.2.3   ADS-C Message Set

The ADS-C message set can be explored in any number of ways, but here examination starts with "high level" objects and then considers the objects that are contained within them. Only those that have changed are mentioned.

ADSDataReport has changed. This is found on page 7-112 of Draft H and page 234 of Revision A. Note the shaded items in this table are the difference between version 2 and version 1, both visible in Revision A.

Draft H	Both	Revision A
	position	
	time	
	fom	
	contract number	
aircraft-address		
aircraft-identification		
	projected-profile	
	ground-vector	
	air-vector	
	met-info	
	extended-projected-profile	
		speed-schedule-profile
	emergency-urgency-status	
etaMinMax		
		toa-range
		rta-status-data
		rnp-profile
		planned-final-approach-speed

Table 7 Evolution of ADSDataReport

DemandContractRequest, found on page 7-110 of Draft H and 231 of Revision A has changed accordingly; with exactly the same fields added and removed.

PeriodicContractRequest, found on page 7-110 of Draft H and 232 of Revision A has changed accordingly; with corresponding fields added and removed. Note the shaded items in this table are the difference between version 2 and version 1.

Draft H	Both	Revision A
	contract-number	
	reporting-rate	
aircraft address modulus		
aircraft-identification-modulus		
	projected-profile-modulus	
	ground-vector-modulus	
	air-vector-modulus	
	met-info-modulus	
	extended-projected-profile-modulus	
eta-min-max-modulus		
		toa-range-modulus
		speed-schedule-profile-modulus
		rnp-profile-modulus
		planned-final-approach-speed-modulus

Table 8 Evolution of PeriodicContractRequest

1 **EventContractRequest,** found on page 7-110 of Draft H and 232 of Revision A, has changed
2 correspondingly to Table 7 and Table 8 but there has also been evolution within the structure. Note
3 the change from air-speed to airspeed between Draft H and Revision A. The corresponding data
4 structures also change.
5

Draft H	Both	Revision A
	contract-number	
lateral-deviation-change		
		lateral-deviation
vertical-rate-change		
		vertical-rate-deviation
level range-change		
		level-range-deviation
	way-point-change	
air-speed-change		
		airspeed-change
	ground-speed-change	
heading-change		
extended-projected-profile-change		
		epp-change
		rta-status-change
	fom-change	
track-angle-change		
	level change	
vertical-deviation-change		
out-of-vertical-boundaries		
		vertical-clearance-deviation
		airspeed-range-deviation
		turbulence-deviation
		rnp-not-met
		planned-final-approach-speed-change

6 **Table 9 Evolution of EventContractRequest**
7

1 The corresponding bit string EventTypeNotSupported has been changed between Draft H and
2 Revision A to reflect the differences in Table 9. See Draft H page 7-116 and Revision A page 236.
3 Likewise EventTypeReported on page 237 of Revision A differs from Draft H 7-116 in the same way.
4 Although not identical, the Draft H data structure, ExtendedProjectedProfileChange, defined on page
5 7-117, corresponding to the data element extended-projected-profile-change in Table 9, has been
6 more or less replaced in Revision A by the structure EPPEventChange, defined on page 232 and
7 corresponding to the element epp-change in Table 9.
8 The data structure ADSPositiveAcknowledgement in Revision A contains one extra element
9 compared to that in Draft H, connectedATSUList. See pages 7-111 and 233. Similarly the data
10 structure ADSNonCompliance in Revision A has the same element added compared to Draft H.
11 Definitions occur on the same pages. Likewise ADSReject has gained the same element in Revision
12 A compared to Draft H. Defintions on pages 7-112 and 234.
13 The ExtendedProjectedProfile data structure differs between Draft H (page 7-116) and Revision A
14 (page 221). The following table lists the differences. Note the waypoint sequence is a repeated list of
15 the elements up to gross-mass, below.

Draft H	Both	Revision A
		computation-time
	way-point-sequence	
way-point-position		
		latitude
		longitude
		level
way-point-name		
		name
way-point-time		
		estimated-time
way-point-estimated-speed		
		estimated-speed
way-point-vertical-type		
		vertical-type
way-point-lateral-type		
		lateral-type
way-point-level-constraints		
		level-constraint
way-point-speed-restriction		
		speed-contraint
way-point-rta		
		time-constraint
gross-mass		
predicted-gross-mass-at-tod		
		current-gross-mass
speed-schedule		
	trajectory-intent-status	

16 **Table 10 Evolution of ExtendedProjectedProfile**
17
18
19
20 Although many elements of the Draft H EPP have a corresponding element in Revision A, almost
21 every data type has changed. Two notable changes are that latitudes and longitudes in the range 0 to
22 -1 degrees can be expressed "cleanly" in Revision A while they cannot in Draft H (compare Latitude
23 on page 7-118 of Draft H with Latitude on page 240 of Revision A), and that the lateral-type element
24 from Revision A, of type LateralType, (page 239) includes an optional followedByDisco where by the
25 existence of a discontinuity in the FMS computed trajectory can be indicated.
26 New in Revision A, version 2 are data structures associated with RNP. These include RNPProfile,
27 RNPSegment, RNPSegmentPoint and RNPValue all defined on page 243
28 For final approach speed, the apart from what is mentioned already, in Revision A version 2 is the
29 data type FinalApproachSpeedChange on page 239.
30

C.3 Prototype Impacts

Observing all changes carried out of the evolution from revision H to ATN baseline 2 the final result is that the actual prototypes are not compatible. It will be necessary to update the prototypes to a new messages format.

1   **-END OF DOCUMENT-**

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