



WA1 High Level Functional Requirement Definition (FRD) for D-Taxi - Advanced Package - Final Version

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Task contributors	
<i>Airbus Operations S.A.S, THALES Avionics, Leonardo</i>	
Abstract	
<p>This document is the final version of the high-level “Functional Requirement Document” related to the onboard part of the Airport Surface Taxi Clearance service (D-TAXI), also called “Taxi routing function”. It is elaborated in the frame of Project 9.13 Advanced Package that succeeded the Initial Package study. It also updates previous D02 and D03 versions).</p> <p>This document is applicable to mainline aircraft & regional aircraft.</p> <p>This document D47 takes into account the Advanced package hypotheses as well as outcomes from Projects 6.7.2 & 6.7.3 operational projects (deliverables and evaluations).</p> <p>The Taxi Routing function contains the following features:</p> <ul style="list-style-type: none"> - Dialog via data link for taxi operations - Compute and display a taxi route - Manage a taxi route <p>Data-link services for CPDLC are the object of Solution #23 and Manual Taxi Routing is the object of Solution #26.</p>	

2 **Authoring & Approval**

Prepared By - <i>Authors of the document.</i>		
Name & Company	Position & Title	Date
Benoît MORIZET	09.13 Project Member	01/03/2016

3

Reviewed By - <i>Reviewers internal to the project.</i>		
Name & Company	Position & Title	Date
Jean-Etienne HIOLLE / THALES Avionics	09.13 Project Member	10/03/2016
Emilio D'ANGELO / Leonardo	09.13 Project Member	15/03/2016
Xavier MOUCHEL / AIRBUS Operations SAS.	09.13 Project Member	10/03/2016
Diane GAWRYSIK / Egis for AIRBUS Operations SAS	09.13/16.06.05 Project Member	10/03/2016
Joël GRUMBACH / for AIRBUS Operations SAS	09.13 Project Member	14/03/2016

4

Reviewed By - <i>Other SESAR projects, Airspace Users, staff association, military, Industrial Support, other organisations.</i>		
Name & Company	Position & Title	Date
Hervé DREVILLON / DSNA	06.07.02 Project leader	16/03/2016
Bernard MOUTON / AIRBUS SAS	09.49 Project member	16/03/2016

5

Approved for submission to the SJU By - <i>Representatives of the company involved in the project.</i>		
Name & Company	Position & Title	Date
Jean-Etienne HIOLLE / THALES Avionics	09.13 Project Member	08/04/2016
Emilio D'ANGELO / Leonardo	09.13 Project Member	08/04/2016
Garance RAYNAUD / AIRBUS Operations SAS	09.13 Project Leader	08/04/2016

6

Rejected By - <i>Representatives of the company involved in the project.</i>		
Name & Company	Position & Title	Date
N/A		

7

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8 **Document History**

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- 10 This deliverable consists of SJU foreground.

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67



68 Executive summary

69 This document defines the Functional Requirements for the Taxi Routing function with data link taxi
70 routes (D-TAXI) and manual taxi routes.

71 It is elaborated in the frame of Project 09.13 (Airport Surface Taxi Clearances) Advanced Package.

72 The project 9.13 is associated to the Operational Focus Area (OFA) 04.020.1 Integrated Surface
73 Management, its Operational Improvement steps are:

- 74 • AO-0205: Automated assistance to Controllers for surface management planning and routing.
- 75 • AUO-0308-A: D-TAXI services supported on the airborne side by DCL/ATN, CPDLC/D-TAXI
- 76 • AUO-0603-A-Enhanced Guidance Assistance to Aircraft on the Airport Surface Combined
77 with Routing

78 The expected benefits for these Operational Improvement steps are mainly related to Predictability
79 and, to a lower extent, to Efficiency and Safety.

80 SESAR 09.13 project is involved in activities led by SESAR Operational Projects 6.7.2 and 6.7.3 in
81 order to coordinate the air/ground operational tests that permit to connect the ATM ground systems
82 with the aircraft system and therefore, the Air Traffic Controllers (ATC) with the flight crews.

83 This new document D47 is an update of the Advanced Package document D03.

84

85 From previous editions, D02 Initial Package and D03 Advanced Package, that brought the following
86 features:

87 D02:

- 88 • Data Link Messages set issued from WG 78 definition [8] with some adjustments/limitation
89 agreed with SESAR Operational Projects 6.7.2 and 6.7.3 operational projects and ground
90 industry.
- 91 • The taxi route depiction is based on the processing of the text contents of data link taxi
92 routes: no graphic data is assumed to be provided in the data link taxi route messages.
- 93 • Use of the Airport Map DataBase (AMDB) standard (ARINC 816 [13]).

94

95 D03:

- 96 • Compatibility with a new AMDB standard (ARINC 816-2 [14]) issued from EUROCAE
97 WG 44 (Aeronautical Databases). In particular, this standard contains the connectivity
98 between airport elements (based on ED-99C/DO-272C [12] at a former version of
99 2011).
- 100 • Compatibility with previous AMDB standard respecting ARINC 816 [13] which may
101 include proprietary connectivity encoding issued from a partner (based on ED-99B /
102 DO-272B [11]).
- 103 • Taking into account of the updated set of messages from standardization RTCA SC-214
104 / EUROCAE WG-78 Data communications draft SPR version M [9]
- 105 • Last outcomes from Work Packages 6.7.2 and 6.7.3 operational projects
- 106 • Functional improvements following V2 Advanced package trials of August 2013

107 D47 mostly brings modifications brought by an evaluation performed in 2014 with a 1st set of
108 prototypes (September 2014). It reflects the contents of prototypes that have been developed for the
109 Advanced Package and that will be used in EXE-719 RTS. It is also based on final versions of RTCA
110 DO-212C/EUROCAE ED-99C for aerodrome mapping [12] and RTCA SC-214/EUROCAE ED-228
111 SPR [28] for ATS data communications (instead of draft M version).

founding members



Avenue de Cortenbergh 100 | B -1000 Bruxelles
www.sesarju.eu

112 This final FRD version of SESAR Project 09.13 project aims at preparing a future implementation in
113 aircraft systems.

114

115 The Taxi Routing function contains the following functional blocks (Main Functions (MF)):

116 ➤ MF1: Dialog via data link for taxi operations

117 ➤ MF2: Compute and display a data link taxi route

118 ➤ MF3: Manage a taxi route

119

120 Data-link services for CPDLC is the object of Solution #23 and Manual Taxi Routing is the object of
121 Solution #26.

122

123 **1 Introduction**

124 **1.1 Purpose of the document**

125

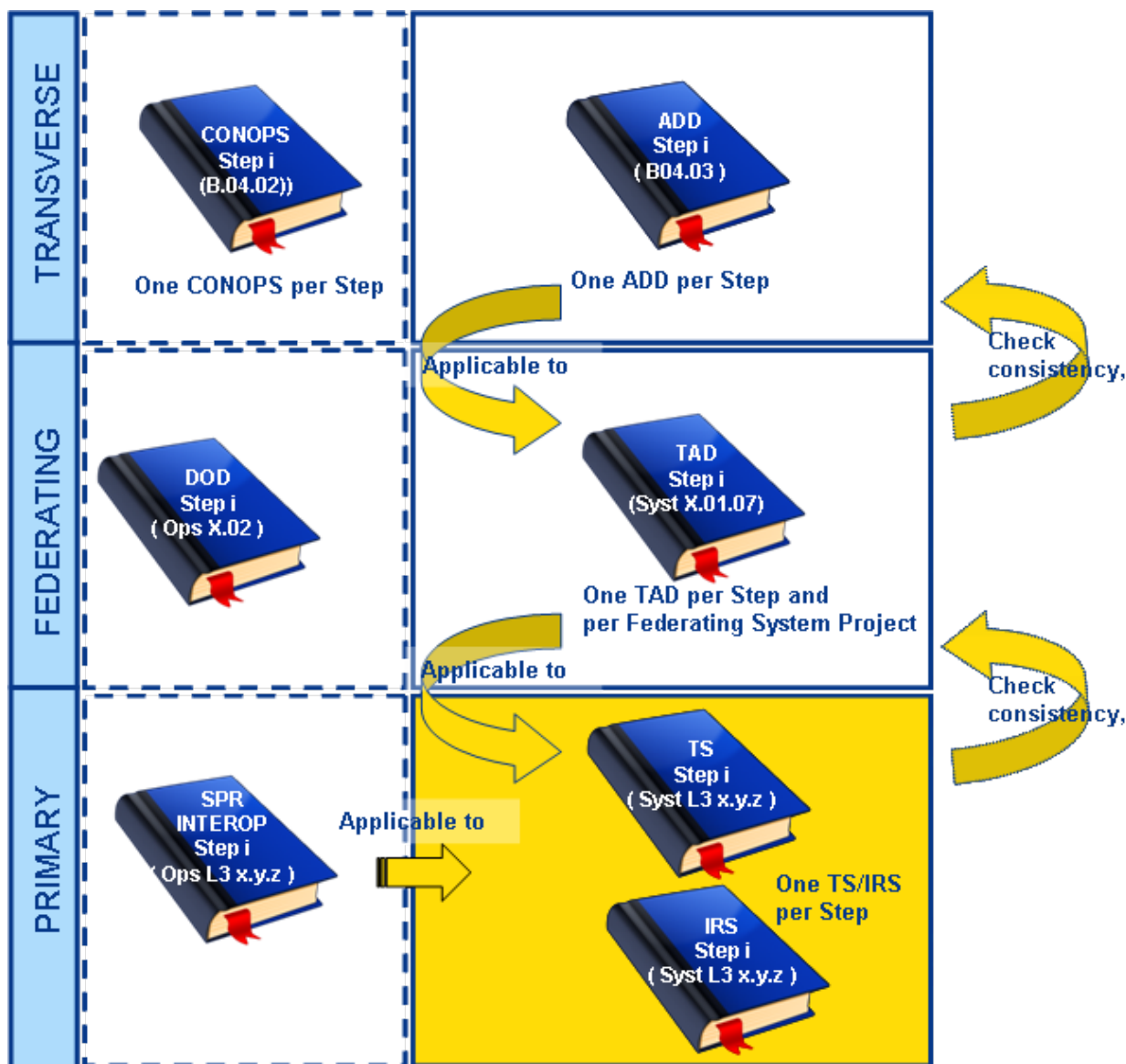
126 The objective of the Function Requirement Document (FRD) is to identify all applicable requirements
 127 the function has to fulfill to meet the aircraft (ACFT) specification, including the functional
 128 requirements, the performances to be achieved, the operational requirements, the HMI requirements,
 129 safety requirements, commonality/reuse requirements, etc.

130 This document concerns the Taxi Routing function which specifically includes the D-TAXI function
 131 already introduced in previous issues of SESAR (Single European Sky Air Traffic Management
 132 Research) high level requirements document.

133 This document belongs to Project 09.13 Airport Surface Taxi Clearances.

134 This document concerns WA 2.1 (mainline aircraft) and WA 2.3 (regional aircraft).

135



136

137

Figure 1: TS document with regards to the other SESAR deliverables

1.2 Intended readership

139 This document reflects the last results of evaluations performed and current prototypes to be used in
140 project 06.03.01 for RTS EXE-719. This why it is sent to concerned partners in these projects.

141 In addition, representatives of Operational Projects 06.07.02 (A-SMGCS Routing and planning
142 function) and 06.07.03 (A-SMGCS Guidance function) are also concerned to ensure that the
143 development of the D-TAXI service on the onboard side is consistent with the corresponding
144 development of the Air Traffic Control (ATC) System and operational requirements.

145

1.3 Inputs from other projects

147 The SESAR 9.13 project has been started using the objectives and conclusions of EMMA2 (European
148 project ended in 2009), especially regarding HMI aspects.

149 Most features evolved taking into account the results of evaluations done in the frame of SESAR 9.13,
150 notably coupled air/ground evaluations (Real Time simulation [23]) realized in 2012 and V2 advanced
151 package evaluations realized in 2013.

152

153 This document takes into account the following documents issued in the context of SESAR OFA
154 04.02.01:

- 155 • OFA04.02.01 (Integrated Surface Management) Interim SPR (06.07.02-D77), 00.01.00,
156 05/08/2015 (ref [24])
- 157 • Second OFA04.02.01 (Integrated Surface Management) Interim OSED (06.07.02-D76),
158 00.01.0, 30/11/2015 [22]
- 159 • Preliminary INTEROP for advanced surface routing (06.07.02-D79), 00.01.00, 03/11/2015
160 [19]
- 161 • Update of Preliminary INTEROP for advanced surface guidance (06.07.03-D65), 00.01.00,
162 06/08/2015[20]

163

164

165 **Note:** At the time of edition of this document, the reference is the interim OSED version (06.07.02
166 D76 ref. [22]). The final version of OFA 04.02.01 OSED will be available by mid-Aug. 2016 after this
167 FRD issue.

168 1.4 Structure of the document

169 The document is structured as follows:

- 170 • **Chapter 1 – Introduction** provides general information about the document (purpose,
171 functional block overview, intended audience) and editorial information (glossary of terms,
172 acronyms, etc.).
- 173 • **Chapter 2 – General Functional block Description** describes the functional context and
174 decomposition.
- 175 • **Chapter 3 – Requirements** provides operational and functional requirements on the Taxi
176 Routing cockpit function.
- 177 • **Chapter 4 – Assumptions** describes the suppositions taking into consideration to
178 complete the possible lack of operational requirements.
- 179 • **Chapter 5 – References** lists all the reference documents.
- 180 • **Appendix A: list of datalink messages**
- 181 • **Appendix B: Operating methods for D-TAXI**

182

183 1.5 Requirements Definitions – General Guidance

184 This document presents requirements issued from the Functional Definition and results from
185 operational evaluations. Not only requirements are provided but some assumptions are given that
186 come either about the operational procedures (not under project 09.13 responsibility) or technical
187 constraints.

188

189 The document is organized with a breakdown by requirements type as follows:

190

- 191 • Chapter 3 provides functional and operational requirements for the Taxi Routing cockpit
192 function:
 - 193 ✓ Section 3.1 provides general Operational requirements concerning:
 - 194 ➤ The function needs
 - 195 ➤ The interface with the Air Traffic Control System
 - 196 ➤ The function integration
 - 197 ➤ The human factors
 - 198 ➤ The design
 - 199 ✓ Section 3.2 provides Functional requirements for Avionics systems. It is split into
200 three sub-sections, each one focusing on a function defined to support specific pilots
201 tasks:
 - 202 ➤ **MF1** supports the Data link part of the function with the capacity to
203 send/receive messages to/from the ATC and the capability to display those
204 exchanges.
 - 205 ➤ **MF2** allows to compute and display a taxi route.
 - 206 ➤ **MF3** supports the different possible actions to manage a taxi route: insertion,
207 deletion, confirmation.
- 208 • Chapter 4 provides the assumptions considered to operate with the function.
- 209
- 210

211

212
213

214 1.6 Functional block Purpose

215 The **Taxi Routing function** contains the following **Main Functions** (MF):

- 216 ➤ MF1: Dialog via data link for taxi operations
- 217 ➤ MF2: Compute and display a data link taxi route
- 218 ➤ MF3: Manage a taxi route

219 These main functions are linked to different onboard systems thus they have an impact on the
220 functional airborne architecture.

221

222 Impact on functional airborne architecture

223 Communication:

- 224 • CPDLC capability to manage D-TAXI messages including reception route, clearances and
225 emission of acknowledgment and requests.

226 Navigation:

- 227 • Airport surface navigation capability of computing the taxi route using the uplinked clearances
228 or the manually inserted taxi route

229 Displays and controls:

- 230 • Visualize and respond to D-TAXI clearances
- 231 • Visualize and send requests
- 232 • Visualize taxi routes on the airport moving map (loading of uplinked clearance data)
- 233 • Visualize alerts for data messages not sent, not arrived or corrupted
- 234 • Insert/modify/erase a taxi clearance received via voice

235 Databases:

- 236 • Aerodrome maps database stored on-board are intended to be compliant with the AMDB
237 standard ARINC 816 [13] and ARINC 816-2 [14] (Last version published is ARINC 816-3. AN
238 intermediate version 816-2 has been implemented). ARINC 816-2 is based on ED-99C/DO-
239 272C [12]).

240

241 The above **functional blocks** for project 09.13 are given in the [26] Project 9.49 D04 – Batch 1, 2, 3 -
242 Consolidated functional Airborne Architecture, October 2015.

243

244 1.7 Functional block Overview

245 The Taxi Routing function mainly contains the onboard part of the future D-TAXI service (see
246 definition in §1.8) within its MF1 – Dialog via data link for taxi operations. Refer to §1.6 for a quick
247 overview of MF2 and MF3.

248 The D-TAXI service is defined by the Chapter 3 §3.6 of the “RTCA SC-214 / EUROCAE WG-78 Data
249 communications SPR” (ref [28]). It provides the following Operational Service Description (OSD):

250

251 As part of D-TAXI service, the onboard D-TAXI function is intended to be used to request and receive:

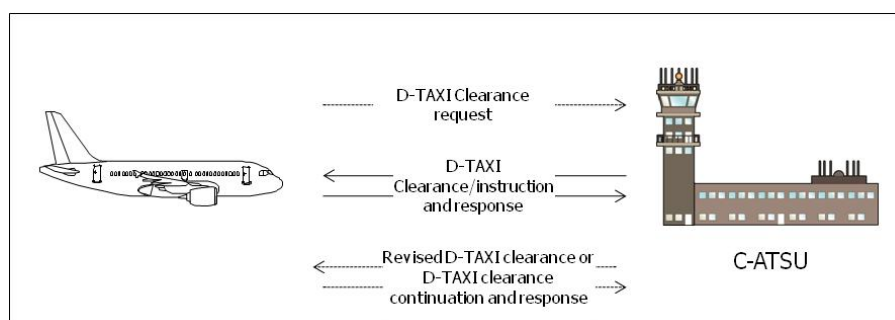
- 252 • Departure clearance,
- 253 • departure taxi route information as well as other taxi information prior to taxi,
- 254 • clearances for aircraft engine start-up, and expect start-up,
- 255 • clearances for aircraft pushback from a gate/stand, and expect pushback,
- 256 • taxi route and clearance for aircraft to taxi from a point on the airport to another point on
- 257 the airport surface (including special operations, e.g. de-icing)
- 258 • arrival taxi route information prior to final approach,
- 259 • arrival taxi route and clearance to taxi from the landing runway exit to another point on
- 260 the airport, after clearing the landing runway, and
- 261 • an updated taxi clearance:
- 262 ○ continuation – extension of a taxi clearance issued when the flight crew has
- 263 reached the end of the first taxi clearance but has not reached the desired
- 264 destination, or
- 265 ○ revision – change to any previous taxi route clearance (may also contain
- 266 continuation data).

267 **Note:** ATSU's and aircraft implementing D-TAXI are not required to implement all of the D-TAXI

268 capabilities. A given capability may not be applicable (e.g. some ground systems do not provide start-

269 up or pushback services).

- 270 • A complementary function called Manual Taxi has been added to manage onboard taxi routes
- 271 whether they are received by voice or by datalink (AUO-0603-A-Enhanced Guidance
- 272 Assistance to Aircraft on the Airport Surface Combined with Routing).



273

274

Figure 2: Example of D-TAXI Dialog

275

276 The objective of D-TAXI service is mostly to reduce frequency congestion and uplink information to

277 the cockpit system. Hence, it can support increasing capacity in terminal areas or at least allow

278 getting closer to the theoretical airport capacity.

279 The Operational Improvement steps corresponding to D-TAXI have been identified in [17]:

- 280 • AO-0205: Automated assistance to ATCOs for surface management planning and routing.
- 281 • AUO-0308-A: Provision of planned route using D-TAXI services supported on the airborne
- 282 side by DCL/ATN, CPDLC/D-TAXI

283 The expected benefits for these Operational Improvement steps are mainly related to Predictability in

284 order to improve the overall efficiency. The on-board function contributes to efficiency via the new

285 tools to pilots are provided with.

286

287 **1.8 Glossary of terms**

288 The following terms have been defined in previous issues. Except if specifically mentioned, definitions
289 are issued from or consistent with the following documents: WG78 SPR ref. [9], ARINC 816 ref. [14],
290 Interim OSED ref. [22].

Term	Definition
Active element	Airport surface element where the aircraft is currently positioned. The active element is defined only if the aircraft is on the ground. It is used to determine the beginning of a taxi route.
Airport Mapping DataBase	Airport database containing all information compliant with ARINC 816 [[14]. It relates to only one airport.
Airport Moving Map (AMM)	This is a graphical display of airport information that contains all the necessary details of the airport: runways, taxiways, buildings, parking areas, de-icing areas etc.
Cleared taxi route	Route status associated to a taxi route cleared by ATC and provided by voice or in the uplink message element UM308 ([runway] TAXI [taxi route]).
Data link Messages Composition Interface	This is an HMI that permits to compose D-TAXI requests, reports or information messages before transfer to the Data link Messages Display. It includes a display and an input device, such as a keyboard, so that pilots can enter parameters in text format.
Data link Messages Display	This is an HMI that is in charge of displaying Uplink Messages received from the Air Traffic Control System and Downlink Messages prepared by pilots. This HMI also permits to prepare standard pilots responses (WILCO, etc.) to Uplink Messages.
Data Link Taxi Routing configuration	Reduced functionality configuration of the Taxi Routing function that supports only the CPDLC alphanumeric cockpit displays associated to the Main Function 1 "Dialog via data link".
D-TAXI service	According to the EUROCAE WG-78 PU-10 SPR Chapter 3.6 (ref [28]), the Data Link Taxi (D-TAXI) service consists of the following seven sub-services: <ul style="list-style-type: none"> - Taxi Route Information – information about the future taxi route (EXPECT) provided prior to departure (Taxi-out) or to the approach (Taxi-In) as well as other departure/arrival information. This is not a cleared route. - Start-Up – Clearance for aircraft engine start-up as well as departure information. - Pushback – Clearances for aircraft pushback from a gate/stand as well as departure information. - Taxi-Out – Initial taxi route clearance for aircraft to taxi from a point on the airport to another point on the airport surface. - Arrival Taxi Information – The expected arrival taxi route as well as other arrival information provided to flight crews while still in flight. - Taxi-In – Initial arrival taxi clearance for aircraft to taxi from landing runway exit to another point on the airport, provided after vacating the

Term	Definition
	<p>landing runway.</p> <ul style="list-style-type: none"> - Taxi-Update – Update (i.e., continuation or revision) to any previously delivered taxi clearance.
Manual Taxi Routing configuration	Functionality configuration of the Taxi Routing function supporting the following Main Functions: MF2 “Compute and display a taxi route” and, MF3 “Manage a taxi route”. It refers to the graphical display of a taxi route path and route indications on a Navigation Display associated to the pilot insertion of a route sequence thanks to a MCDU.
Manual taxi route	Taxi route issued from pilot insertion. This function is specifically intended to be used by pilots on-board.
Map Reference Point	Reference point to be used to center the airport map in PLAN mode.
Planned taxi route	ATC anticipated taxi route (arrival taxi route information) expected to be send to the crew as a clearance also known as Expected taxi route.
Route input data	Input data (origin, sequence of airport surface elements and destination) that is required in order to compute a taxi route path. The route input data is provided either by a pilot input (manual taxi route) or a data link taxi message element (data link taxi route) – EXPECT TAXI (UM305), TAXI (UM308) or INTERSECTION DEPARTURE (UM317).
Soft Control Panel	The dedicated interactive part of the display on the bottom of the ND display.
Taxi clearance limit	A taxi clearance contains a clearance limit, which is the point at which the aircraft must stop until further permission to proceed is given.
Taxi Routing function	Main function configuration gathering both Data link taxi routing configuration and Manual taxi routing configuration. Thus answering to all Main Functions: MF1 “Dialog via data link”, MF2 “Compute and display a taxi route”, MF3 “Manage a taxi route”.
Taxi route navigation helper	Sequence of names of the airport surface elements that make up the complete taxi route received from ATC. It is displayed on the AMM Lower Banner. Note that it includes clearance elements plus system added elements necessary to fill-in discontinuities.

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294

1.9 Acronyms and Terminology

Term	Definition
A	Affirm
ACM	ATC Communication Management (service)
ACFT	Aircraft
ADD	Architecture Definition Document

founding members



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Term	Definition
AGL	Airport Ground Lighting
AIRAC	Aeronautical Information Regulation And Control
AMDB	Airport Mapping Data Base
AMM	Airport Moving Map
ANF	Airport Navigation Function
A-SMGCS	Advanced-Surface Movement Guidance and Control System
ASRN	Aerodrome Surface Routing Network
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
ATS	Air Traffic Service
ATSU	Air Traffic Service Unit (ground)
BTV	Brake To Vacate
CAPT	CAPTain
C-ATSU	Current Air Traffic Service Unit
CCD	Cursor Control Device
CDG	Charles De Gaulle – Paris Roissy airport
CPDLC	Controller Pilot Data link Communications
DCDU	Data Link Cockpit Display Unit
DCL	Departure Clearance
DLIC	Data Link Initiation Capabilities
DM	Downlink Message
DO	Document Order (RTCA)
DOD	Detailed Operational Description
D-TAXI	Data link TAXI
E-ATMS	European Air Traffic Management System

Term	Definition
EBS	Enhanced Braking System
EMMA	European Airport Movement Management by A-SMGCS
EUROCAE	EUROpean Organization for Civil Aviation Equipment
FANS	Future Air Navigation System
FDD	Function Description Document
FMS	Flight Management System
F/O	First Officer
FRD	Functional Requirements Document
FWS	Flight Warning System
GMG	Ground Marker Guidance
HLDG POINT	HoLDinG Point
HMI	Human Machine Interface
HP	Holding Point
IRS	Interface Requirements Specification
INTEROP	Interoperability Requirements
LVP	Low Visibility Procedures
MCDU	MultipurposeControl Display Unit
MF	Main Function
MOSART	Modular Simulator for Airbus Research Tests
N	Negative
ND	Navigation Display
OSD	Operational Service Description
OSED	Operational Service and Environment Definition
PAM	Pilot Acknowledgment Message
P/B	Push Button
PF	Pilot flying
PM	Pilot Monitoring

Term	Definition
PIR	Project Initiation Report
R	Roger
R/T	Radio Telephony
RFW	Request For Work
RTCA	Radio Technical Commission for Aviation
RWY	RunWaY
SC	Special Committee
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.
SPR	Safety and Performance Requirements
TS	Technical Specification
TAD	Technical Architecture Description
TLDT	Target LanDing Time
TS	Technical Specification
TSAT	Target Start-up Approval Time
TWY	TaxiWaY
U	Unable
UM	Uplink Message
WA	Work Area

295 2 General Functional block Description

296 2.1 Context

297 The target is to address 2 operational functions:

- 298 - Datalink taxi routing

299 The data link operational context of the Taxi Routing function (D-TAXI MF1 sub-function) is described
300 in two series of documents, the EUROCAE / RTCA documents on one side, the SESAR documents
301 on the other side.

- 302 - Manual Taxi routing

303 It intends to support pilots in entering the taxi route given by voice by controllers and display it
304 graphically on an airport moving map.

305

306 2.2 Functional block Modes and States

307 Here are the functional blocks identified and reported in Project 9.49 D04 – Batch 1, 2, 3 -
308 Consolidated functional Airborne Architecture, October 2015 [26]. Considering the operational
309 functions, some Functional blocks have 2 modes/states called “Datalink mode” and “Manual mode”.

310 CPDLC block is in charge of CPDLC communication to receive uplink D-TAXI clearances/information,
311 send responses and send requests (Datalink single mode).

312 Lateral positioning block elaborates the aircraft latitude and longitude based on external means like
313 GNSS).

314 Airborne Lateral Navigation block computes the taxi route using as input the uplinked clearances or
315 the manually inserted taxi route.

316 Displays and controls block is divided in sub-blocks in charge of:

- 317 • Visualize and respond to D-TAXI clearances (Datalink mode)
- 318 • Visualize and send requests (Datalink mode)
- 319 • Visualize taxi routes on the airport moving map in both modes (loading of uplinked clearance
320 data or manual input)
- 321 • Visualize alerts for data messages not sent, not arrived or corrupted (Datalink mode)
- 322 • Insert/modify/erase a taxi clearance received via voice (Manual mode)

323 Databases block is the resource used for route display by correlating elements of a taxi route and
324 elements from the airport database. It is transparent to the manual or datalink modes.

325

326 2.3 Major Functional block Capabilities

327 Refer to section 2.2 for the block structure and content.

328 2.4 User Characteristics

329 In this FRD, the considered users are pilots using the system. The overall users' characteristics are
330 described in the document Interim OSED [22]. The OSED will be updated at the end of project
331 06.07.02 after publishing this FRD.

332

333 2.5 Operational Scenarios

334 Operational scenarios are presented in the part 5 of the document Interim OSED ref. [22].

335 Note: these scenarios should not be changed in-depth during the next OSED update. In any case, the
336 impact on this FRD will not be significant.

337 2.6 Functional

338 2.6.1 Functional decomposition

339 Taxi Routing function as subject of this document is the airborne part of the D-TAXI service (see
340 definitions of these two terms in §2.3). It is intended to be implemented in the aircraft systems in order
341 to be able to manage 2 functions:

- 342 • Data link taxi routing and communication (which requires on ground ATSU)
- 343 • Manual taxi routing (independent of any ground systems)

344

345 Data link taxi routing and manual taxi routing share common sub-functions which are:

- 346 • Compute a taxi route,
- 347 • Display a taxi route path on an airport moving map,
- 348 • Display textual taxi route information.

349 With both configurations the crew can act on the taxi route path (deletion / insertion / confirmation).

350 With data link taxi routing configuration the crew can dialog with the ground ATSU.

351

352 The functional breakdown is defined with the following main functions (MF) and sub-functions (SF):

- 353 • MF1 – Dialog via data link
 - 354 ○ SF11 – Make a request or a report to ATC
 - 355 ○ SF12 – Answer to an ATC message
 - 356 ○ SF13 – Display data link messages exchanged
- 357 • MF2 – Compute and display a taxi route
 - 358 ○ SF21 – Compute a taxi route (using manual inputs SF31 or data link information
 - 359 SF13)
 - 360 ○ SF22 – Display a graphical taxi route path
 - 361 ○ SF23 – Display textual taxi route indications
- 362 • MF3 – Manage a taxi route
 - 363 ○ SF31 – Insert a taxi route (manual taxi route)
 - 364 ○ SF32 – Modify a taxi route (either manually inserted or data link)
 - 365 ○ SF33 – Erase a taxi route (either manually inserted or data link)
 - 366 ○ SF34 – Confirm a taxi route as cleared by ATC (either manually inserted or
 - 367 expected route data link)

368

369

370 **2.6.2 Functional analysis**

371 This section describes the content of functions contained in the Taxi Routing Main Functions (MF):

- 372 ➤ MF1: Dialog via data link for taxi operations
- 373 ➤ MF2: Compute and display a data link taxi route
- 374 ➤ MF3: Manage a taxi route

375

376 **MF1 – Dialog via data link for taxi operations**377 The use of data link communications for airport surface taxi clearances (Taxi Routing MF1 – Dialog
378 via data link) participate in:

- 379 • Efficiency benefits : Reduction of taxi times, reduction of taxi errors, increase of punctuality
380 due to less taxi errors
- 381 • Predictability benefits: Increase of ground movements predictability
- 382 • Reducing frequency congestion

383 The consecutive effects are:

- 384 • At aircraft level:
- 385 ○ Environmental sustainability benefits: Reduction in CO2 emissions and reduction of
386 fuel consumption due to improved taxi times,
- 387 ○ Cost effectiveness benefits: Reduction of operational costs also related to reduced
388 taxi times,
- 389 ○ Flexibility benefits: Ability to manage a taxi route revision
- 390 • At airport level:
- 391 ○ Increase of airport predictability per hour and day
- 392 • At both aircraft and airport levels:
- 393 ○ Reduction of taxiing errors and misunderstandings between pilots and controller,
394 because the clearance is visualized and is clearly addressed to the concerned crew.

395 **MF2 – Compute and display a taxi route**396 The use of a graphical tool as an assistance to localize the aircraft and the path the aircraft has to
397 follow on the taxiways and aprons (Taxi Routing MF2 – Compute and display a taxi route) participates
398 in:

- 399 • Supporting the reduction of misunderstandings by providing the crew with a graphical
400 translation of the information
- 401 • Reducing the crew workload during taxi phase by providing the crew with the aircraft and the
402 expected/cleared taxi route,
- 403 • Improving the global situational awareness.

404

405 The graphical display of the cleared taxi route on the AMM along with the aircraft position in real time
406 will especially support low visibility operations. However, it has not to be used as a primary means
407 because the crew can taxi only if they have the appropriate outside view and airport paper charts.

408

409 All large airports in Europe are concerned but greater benefits are expected for those that:

- 410 • have a complex taxiway and runway configuration,
- 411 • experience regular degraded weather conditions.

412
413
414

MF3 – Manage a taxi route

415 Manual input: it allows to insert manually a taxi route sequence and display its associated taxi route
416 path whatever the level of technology used on ground.

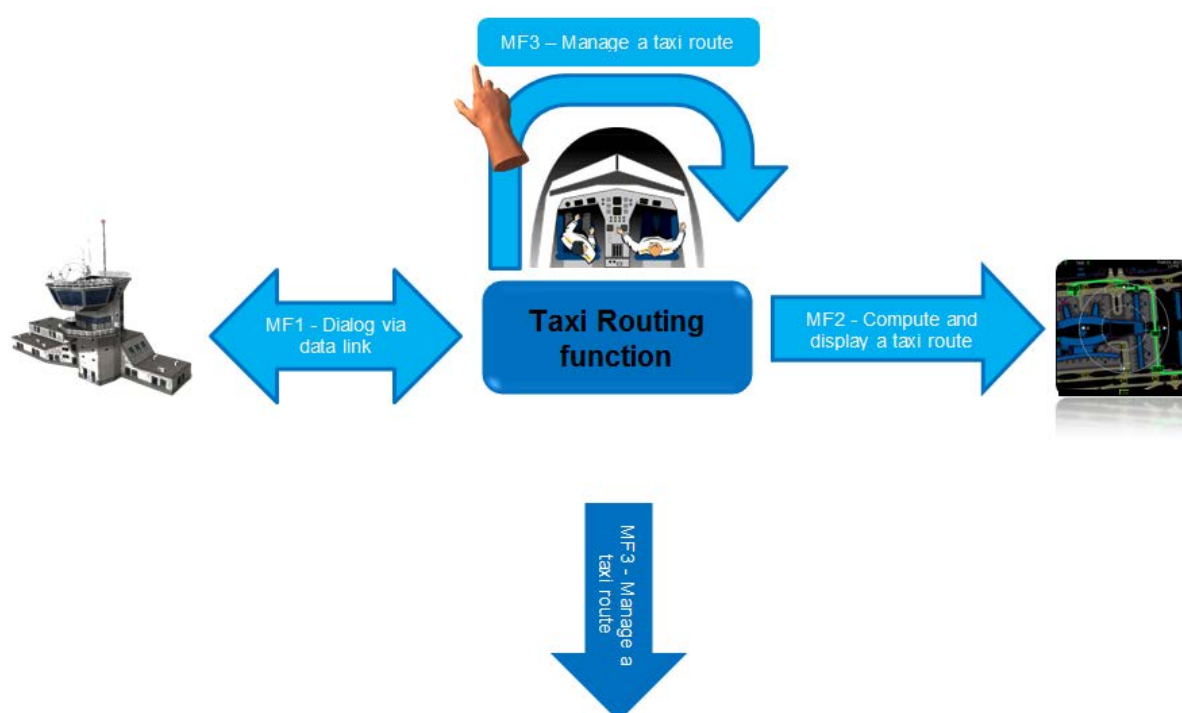
417 Modify and delete a route: Once a taxi route is displayed, the crew may also need to modify or delete
418 the route.

419 For instance, after a route has been entered during preparation at the gate, it is possible to change its
420 status to “confirmed” after it has been cleared by ATC for taxiing (either when the input is given by
421 voice or through data link in case of expected taxi route).

422 **Note**: When a data link taxi route is received it is also interesting to be able to modify manually the
423 taxi route in case of data link failure or additional instructions given by voice.

424

425 The figure below summarizes the operational main function flow around the Taxi Routing function:



426
427
428

Figure 1: Taxi Routing Main Functions - Operational flow

429

Several configurations are available with the Taxi Routing function:

- 430
- Data link taxi route configuration (no graphical display of taxi routes)
 - 431 • Manual taxi routing configuration (graphical display of taxi routes but no data link)
 - 432 • Taxi Routing configuration = Manual taxi routing and Data link taxi route configurations

433

434 **Note**: Another Taxi Routing configuration has been considered allowing the reception of graphical data through
435 data link messages. It requires the airport to be capable of sending D-TAXI messages containing graphical data
436 and the system should be capable to treat this data to directly display the taxi route path without processing the
437 textual information. This configuration has been aborted as ED-228 does not include the corresponding
438 messages.

439

440

2.7 Service View

441 The service is datalink exchange on airport. It corresponds to the 3 functional blocks MF1, MF2, MF3.
442 It is connected with other services to improve traffic management on airports.

443 The on-board function supports this service as explained above in section 2.6.

444 A 2nd service has been added and called "Manual Taxi" to support the crew during taxi operations with
445 enhanced awareness by providing a graphical taxi route presentation on the airport moving map.

446 3 Functional and non-Functional Requirements

447 3.1 Operational requirements

448

449 In this section, only requirements addressing the on-board functions are identified.

450 Higher level requirements defined in OSED/SPR or issued from FANS principles are considered as
451 assumptions and not repeated in this section.

452 Requirements in FRD are supposed to be subject to V&V and linked to V&V means.

453 The status has been updated: most of them are set to <Validated>.

454 Some of them have been set to <Deleted> following last evaluations or because they were redundant.

455 A small number is set to <In progress> because they have been identified during the last trials.

456 Then, traceability is also updated with links to requirements of the last OSED Interim issue [19] and
457 functional blocks from [26].

458 3.1.1 Requirements to Interface with Air Traffic Control 459 System

460 [REQ]

Identifier	REQ-D-TAXI-SESAR-091-2
Requirement	The Taxi Routing function shall be able to handle the CPDLC Uplink Message (UM) elements listed in Appendix A – Table 1 (extracted from the reference document [28]) whether they are received in a single-element or multiple-element message.
Title	Uplink messages handling
Status	<Validated>
Rationale	To comply with D-TAXI WG-78 standard messages that guarantee air/ground interoperability. Some messages have not been retained compared to WG-78 baseline because they are considered as not useful as agreed with operational projects 6.7.2 & 6.7.3.
Category	<Interoperability>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

461

462 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0002	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13	N/A

463

464 [REQ]

Identifier	REQ-D-TAXI-SESAR-018-3
Requirement	The Taxi Routing function shall be able to handle the CPDLC Downlink Message (DM) elements listed in Appendix A – Table 2 (extracted from the reference document [28]) and send them in a single-element or a multiple-element message.
Title	Downlink messages handling
Status	<Validated>
Rationale	To comply with D-TAXI WG-78 standard messages that guarantee air/ground interoperability. Some messages have not been retained compared to WG-78 baseline because they are considered as not useful as agreed with operational

	projects 6.7.2 & 6.7.3.
Category	<Interoperability>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

465
466

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-RTXI.0003	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

467
468
469

[REQ]

Identifier	REQ-D-TAXI-SESAR-226-1
Requirement	The Taxi Routing function shall establish a data link connection using Data Link Initiation Capabilities (DLIC) service between the mobile and the ATSU.
Title	Initiation of Datalink service for taxi routing
Status	<Validated>
Rationale	To fulfill Taxi routing prerequisite: The DLIC service provides the log-on procedure to the ATN and exchanges the required application information. The exchanges are based on ATN baseline 2 protocols, with a CPDLC application.
Category	<Interoperability>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

470
471

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-OSED-DTXI.0026	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

472

3.1.2 Requirements to Interface with cockpit functions

473
474

[REQ]

Identifier	REQ-D-TAXI-SESAR-100-2
Requirement	The Taxi Routing function shall comply with the CPDLC requirements from the Aeronautical Telecommunications Network (ATN) baseline 2.
Title	CPDLC means
Status	<Validated>
Rationale	To be able to communicate with the ground interface as specified in RTCA SC-214 / EUROCAE WG-78 Data communications SPR [28].
Category	<Interoperability>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

475
476

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0609	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13	N/A

477

478 [REQ]

Identifier	REQ-D-TAXI-SESAR-228-1
Requirement	The Taxi Routing function shall provide an access through the HMI to previously sent or received messages.
Title	Message history
Status	<Validated>
Rationale	Flight crew shall have access through the HMI to previously sent or received messages. It includes the data link taxi route either expected or cleared.
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

479
480 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0508	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13	N/A

481

3.1.3 Requirements for taxi routing configuration

482
483 [REQ]

Identifier	REQ-D-TAXI-SESAR-218-1
Requirement	The Taxi Routing function shall be able to work in 3 configurations: <ul style="list-style-type: none"> • Conf. 1: the Taxi Routing configuration (full functionality MF1, MF2 and, MF3), • Conf. 2: the Data Link Taxi Routing configuration (limited to MF1 - "Dialog via data link") and, • Conf. 3: the Manual Taxi Routing configuration (limited to MF2 - "Compute and display a taxi route" without data link data and MF3 – "Manage a taxi route").
Title	Taxi routing configurations
Status	<Validated>
Rationale	These configurations are linked with possible context or on-board implementations: in case of datalink operation, the minimum is to be able to display textual messages (conf. 2). If an AMM is available, advantage is taken to display graphically the taxi route (conf. 1). In case of conventional operation based on voice, a function is proposed to pilots to enter manually taxi route elements so as to display it graphically (conf. 3). These configurations can be implemented separately.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

484
485 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	Not derived from INTEROP/SPR/OSED	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

486

3.1.4 Human Factors

487
488 [REQ]

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Identifier	REQ-D-TAXI-SESAR-005-1
Requirement	The Taxi Routing function design shall minimize any increase in pilots' workload that may interfere with high priority tasks and jeopardize safety.
Title	Pilots' workload
Status	<Validated>
Rationale	To maintain current efficiency and safety level in Cockpit operations. The function should not attract pilots' attention to head down when they are supposed to look out the window.
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

489
490

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	Not derived from INTEROP/SPR/OSED	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

491
492
493

[REQ]

Identifier	REQ-D-TAXI-SESAR-006-1
Requirement	The Taxi Routing function design shall minimize any increase in operator "head-down" time.
Title	Crew attention
Status	<Validated>
Rationale	<p>The use of CPDLC and the moving map allows pilots to spend less time on the moving map than on paper charts: the moving map indicates clearly the taxi route and the aircraft position. There is no or few crew research task.</p> <p>The head-down time seems to be an issue in case of CPDLC use without moving map:</p> <ul style="list-style-type: none"> • Because of the CPDLC interfaces, that could involve more pilots' actions than in current situation in order to manage requests and answers for communication task with ATC. • For specific event such as a taxi route revision, both pilots could spend time in head-down position to identify the aircraft location, the new taxi route on the paper charts and to manage voice and CPDLC communications at the same time. In this case, the CPDLC communication is felt as a workload increase. The time in head-down position is also linked to the proposed mandatory action to check the taxi clearance on the Data link Messages Display. Of course, if this check is imposed in future Standard Operating Procedure (SOP), the head-down time will increase and could limit the Taxi Routing function benefit
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

494
495

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	Not derived from INTEROP/SPR/OSED	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

496
497
498

[REQ]

Identifier	REQ-D-TAXI-SESAR-007-1
Requirement	The Taxi Routing function shall be designed in order to not modify the access

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	to other functions of a higher priority.
Title	HMI definition
Status	<Validated>
Rationale	To ensure pilots can efficiently perform their tasks and be supported in their actions by the cockpit usability.
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

499

500 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	Not derived from INTEROP/SPR/OSED	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

501

502

503 [REQ]

Identifier	REQ-D-TAXI-SESAR-103-1
Requirement	The Taxi Routing function shall be designed in order to ensure that information provided to pilots is easy to use, interpret and manage, and that it is sufficient to help them to execute communication and navigation tasks on airports.
Title	HMI quality
Status	<Validated>
Rationale	To ensure efficiency of cockpit operations to support pilots task performance and reduce workload.
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

504

505 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	Not derived from INTEROP/SPR/OSED	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

506

507

508 [REQ]

Identifier	REQ-D-TAXI-SESAR-215-1
Requirement	The Taxi Routing function shall be designed in order to permit that the flight crew can keep the current task sharing during Taxi-Out and Taxi-In phases when the aircraft is on ground: <ul style="list-style-type: none"> - PF manages taxi while PM manages communications, - PF main task is to look outside and PM to crosscheck moving map and outside view, - PM manages navigation.
Title	Crew tasks sharing
Status	<Deleted>
Rationale	DELETED because it is already found in assumption FRD-HYP-D-TAXI-SESAR-3-1-D02. The purpose of an FRD is to identify functional requirements rather than operational requirements issued from OSED. To stay in line as much as possible with current procedures and avoid additional training, learning, confusion on the way to operate onboard.
Category	<HMI>
Validation Method	<Real Time Simulation>

Verification Method	<Test>
---------------------	--------

509

510 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>		N/A
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

511

512

513 [REQ]

Identifier	REQ-D-TAXI-SESAR-216-1
Requirement	The Taxi Routing function shall be designed in order to comply with DO-257A [12] requirements on display visibility.
Title	Information visibility
Status	<Validated>
Rationale	To keep a good quality of displayed information and controls efficiency allowing pilots to comfortably perceive the visual information displayed on the screens and task performance whatever the lighting conditions. Refer to DO-257A § 3.1.3 Display visibility: "The display shall be readable under the full range of normally expected flight deck illumination conditions. Display luminance shall not interfere with the usability of other flight deck displays nor produce unacceptable glare against the windscreen or other reflective surface. The operator shall have an unobstructed view of displayed data, including data on the Electronic Map Display and all associated remote status and mode indicators, when in the normal seated position."
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

514

515 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	Not derived from INTEROP/SPR/OSED	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

516

517 [REQ]

Identifier	REQ-D-TAXI-SESAR-217-1
Requirement	The Taxi Routing function shall be designed in order to enable operations that occur frequently to be executed with a minimum number of actions.
Title	
Status	<Deleted>
Rationale	Deleted because it can be part of FRD-D-TAXI-SESAR-006 and the number of actions is not the only performance criterion. -frequently used control has to be promptly accessed or requires an optimized numerous of steps, to optimize efficiency and reduce potential human errors.
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

518 [REQ Trace]
519

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>		N/A
<ALLOCATED_TO>	<Functional block>		N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

520

521

522 [REQ]

Identifier	REQ-D-TAXI-SESAR-224-1
Requirement	The aircraft system shall indicate to the flight crew a detected loss of CPDLC connection for D-TAXI service.
Title	Loss of CPDLC connection
Status	<Validated>
Rationale	To support pilots task performance and reduce workload.
Category	<Interoperability>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

523 [REQ Trace]
524

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.03-SPR-DTAX.0016	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

525

526

527

3.1.5 Data constraints

528 [REQ]

Identifier	REQ-D-TAXI-SESAR-063-2
Requirement	The Taxi Routing function shall use databases compatible with the AMDB standard ED99-C[12].
Title	Airport Databases
Status	<Validated>
Rationale	Need for interoperability to allow a coherent graphical representation of taxi route tracks superimposed to an airport moving map provided by ATCo. ARINC 816-0 is based on ED-99B / DO-272B [11] and ARINC 816-2 on ED-99C/DO-272C [12].
Category	<Operational>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

529

530 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0005	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0006	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

531

532

533

3.2 Functional requirements

534 Functional requirements and operational requirements share the same sequence of identifiers (see §
535 3.1): FRD-D-TAXI-SESAR-"req. number"-“req. version”. Functional blocks are the ones mentioned in
536 §1.6.

537

3.2.1 MF1: Dialog via data link for taxi operations

538

3.2.1.1 Request or Report

539 START-UP and PUSHBACK

540

541 [REQ]

Identifier	REQ-D-TAXI-SESAR-104-2
Requirement	The Taxi Routing function shall permit to compose a REQUEST START-UP message (DM134) via the Data link Messages Composition.
Title	Request Start-Up
Status	<Validated>
Rationale	To allow the flight crew to obtain the start-up clearance for the aircraft (D-TAXI Start-Up sub-service). The start-up request may be combined with pushback or taxi-out requests.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

542

543 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13	N/A

544

545 [REQ]

Identifier	REQ-D-TAXI-SESAR-105-2
Requirement	The Taxi Routing function shall permit to compose a REQUEST PUSHBACK message (DM131) via the Data link Messages Composition.
Title	Request Push-back
Status	<Validated>
Rationale	To allow the flight crew to obtain the pushback clearance (D-TAXI Pushback sub-service). The pushback request may be combined with the start-up or taxi-out requests.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

546

547 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Full>
<ALLOCATED_TO>	<Functional block>	Communication -	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

548

549 TAXI

550

551 [REQ]

Identifier	REQ-D-TAXI-SESAR-106-2
Requirement	The Taxi Routing function shall permit to compose a REQUEST TAXI message (DM135) via the Data link Messages Composition.
Title	Request Taxi
Status	<Validated>
Rationale	To allow the flight crew to taxi-out or taxi-in on a cleared taxi-route (D-TAXI Taxi-Out or Taxi-In sub-service).
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

552

553 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Full>
<ALLOCATED_TO>	<Functional block>	Communication -	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls -	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

554

555

556 [REQ]

Identifier	REQ-D-TAXI-SESAR-107-2
Requirement	The Taxi Routing function shall permit to compose via the Data link Messages Composition a data link message that contains a taxi clearance request (REQUEST TAXI, DM135) concatenated with : <ul style="list-style-type: none"> • FOR DE-ICING (DM127) • ABLE INTERSECTION (DM128) • FOR DE-ICING + ABLE INTERSECTION
Title	Taxi request
Status	<Validated>
Rationale	To allow the flight crew to indicate the reason for the taxi request: <ul style="list-style-type: none"> • FOR DE-ICING (DM127): to indicate that the purpose of this request is to reach a de-icing area. • ABLE INTERSECTION (DM128): to indicate its capacity to use an intersection runway.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

557

558 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	N/A
<ALLOCATED_TO>	<Functional block>	Communication -	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls -	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

559

560 DE-ICING

561

562 [REQ]

Identifier	REQ-D-TAXI-SESAR-108-2
Requirement	The Taxi Routing function shall permit to compose a REQUEST DE-ICING message (DM132) via the Data link Messages Composition.
Title	De-icing request
Status	<Validated>
Rationale	To allow the crew to ask for de-icing.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

563

564 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	N/A
<ALLOCATED_TO>	<Functional block>	Communication -	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

565

566 Note: the way de-icing is requested should be clarified because the request is not necessarily to be
567 done by crews to ATC. However, ATC should be informed of the need for de-icing to anticipate delays
568 to release aircraft.

569

570

571 FREE TEXT

572

573 [REQ]

Identifier	REQ-D-TAXI-SESAR-113-1
Requirement	The Taxi Routing function shall permit to add free text to a D-TAXI clearance request via the Data link Messages Composition.
Title	Free text
Status	<Validated>
Rationale	To allow the flight crew to add non-pre-formatted information.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

574

575 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Full>
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

576

577

578 **3.2.1.1.1 Request for Expected Route information**

579 [REQ]

Identifier	REQ-D-TAXI-SESAR-110-2
Requirement	The Taxi Routing function shall permit to compose a REQUEST EXPECTED

	TAXI ROUTING [ground locationO] message (DM136) via the Data link Messages Composition.
Title	Expected taxi routing
Status	<In progress>
Rationale	To allow the flight crew to get an early understanding of what the taxi route <i>might</i> be (D-TAXI Departure Information sub-service or D-TAXI Arrival Taxi Information sub-service).
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

580

581 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	<Full>
<ALLOCATED_TO>	<Functional block>	Communication -	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

582

583 **3.2.1.1.2 Report on Taxi Route operations**

584 [REQ]

Identifier	REQ-D-TAXI-SESAR-112-2
Requirement	The Taxi Routing function shall permit to compose a READY FOR START-UP (or PUSHBACK or TAXI) via the message READY FOR [clearance type][assigned time] (DM129) in the Data link Messages Composition Interface and allow input of the time when the crew is ready to execute the relevant clearance.
Title	Report "Ready for Start-Up"
Status	<Validated>
Rationale	To allow the flight crew to coordinate with ATCO on the time of start-up of engines or push back or taxi in order to optimize the traffic management.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

585

586 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	N/A
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

587

588

589 [REQ]

Identifier	REQ-D-TAXI-SESAR-221-1
Requirement	The Taxi Routing function shall permit to compose a DE-ICING COMPLETE via the message DM108 refer to Appendix A in the Data link Messages.
Title	Report "De-Icing complete"
Status	<In progress>
Rationale	To allow the flight crew to coordinate with ATCO at the end of the de-icing
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

590

591 [REQ Trace]

founding members

Avenue de Cortenbergh 100 | B -1000 Bruxelles
www.sesarju.eu

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	N/A
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

592

593 **3.2.1.2 Answer to an ATC message**594 WHEN CAN YOU ACCEPT START-UP / PUSHBACK / TAXI

595

596 [REQ]

Identifier	REQ-D-TAXI-SESAR-114-1
Requirement	<p>Following reception of WHEN CAN YOU ACCEPT (UM283) [clearance type] (clearance type is either START-UP or PUSHBACK or TAXI) the Taxi Routing function shall enable the flight crew to send to the Air Traffic Control System a data link message among the following ones:</p> <ul style="list-style-type: none"> • WE CAN ACCEPT [clearance type] [assigned time] (DM137): the flight crew can accept the specified clearance at the specified time. • WE CANNOT ACCEPT [clearance type] (DM138): the flight crew cannot accept the specified clearance.
Title	Answer to "WHEN CAN YOU ACCEPT" message
Status	<Validated>
Rationale	To comply with "RTCA SC-214 / EUROCAE WG-78 Data communications SPR" [28]. UM243 is an open negotiation message and this requirement is in line with the FANS mechanism for the handling of an open negotiation message.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

597

598 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	N/A
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

599

600

601 CAN YOU ACCEPT INTERSECTION

602 [REQ]

Identifier	REQ-D-TAXI-SESAR-115-2
Requirement	The Taxi Routing function shall permit to compose, via the Data link Messages Display, the AFFIRM message (DM4) or the NEGATIVE message (DM5) answering a CAN YOU ACCEPT INTERSECTION [positionInformation] FOR DEPARTURE RUNWAY [runway] message (UM313).
Title	Answer to "Can you accept intersection?"
Status	<Validated>
Rationale	To comply with "RTCA SC-214 / EUROCAE WG-78 Data communications SPR" [28] requirement.
Category	<Interoperability>
Validation Method	<Real Time Simulation>

Verification Method	<Test>
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603

604 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	N/A
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

605

606 Answer to a route clearance

607 [REQ]

Identifier	REQ-D-TAXI-SESAR-232-1
Requirement	The Taxi Routing function shall permit to answer to a route clearance (UM73, 79, 80, 83), via the Data link Messages Display, with a WILCO or UNABLE.
Title	Answer to “Can you accept intersection?”
Status	<In progress>
Rationale	To comply with “RTCA SC-214 / EUROCAE WG-78 Data communications SPR” [28] requirement – see table 1.
Category	<Interoperability>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

608

609 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	N/A
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

610

611 **3.2.1.3 Datalink messages display**

612 [REQ]

Identifier	REQ-D-TAXI-SESAR-116-2
Requirement	The Taxi Routing function shall be able to display to the crew on a Data link Messages Display the CPDLC Uplink Message elements listed in Appendix A Table 1 (message elements received from the ATC Ground System) except LOGICAL ACKNOWLEDGMENT (UM227), whether they are received in a single-element or multiple-element message
Title	Uplink messages display
Status	<Validated>
Rationale	As a solution to comply with “RTCA SC-214 / EUROCAE WG-78 Data communications SPR” [28] requirement to give a representation to the crew of the data link messages exchanged.
Category	<Interoperability>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

613

614 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	N/A
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

615

616

617 [REQ]

Identifier	REQ-D-TAXI-SESAR-117-2
Requirement	Upon flight crew action on Data link Messages Composition the Taxi Routing function shall display on the Data link Messages Display the CPDLC Downlink Message elements listed in Appendix A Table 2 (message elements composed by the flight crew) except DM62 ERROR and DM100 LOGICAL ACKNOWLEDGMENT.
Title	Downlink messages display
Status	<Validated>
Rationale	As a solution to comply with "RTCA SC-214 / EUROCAE WG-78 Data communications SPR" [28] requirement to give a representation to the crew of the data link messages exchanged.
Category	<Interoperability>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

618

619 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	N/A
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

620

621

3.2.2 MF2: Compute and display a taxi route

622

3.2.2.1 Display a taxi route

623 Planned taxi route received via datalink

624 According to "RTCA SC-214 / EUROCAE WG-78 Data communications SPR" [28], the D-TAXI
625 Departure Taxi Route Information sub-service allows to give a flight crew an early understanding of
626 what the taxi route might be. The expected taxi route is not yet a clearance but information.

627 Display the planned taxi route on the AMM

628

629 [REQ]

Identifier	REQ-D-TAXI-SESAR-118-2
Requirement	The Taxi Routing function shall extract the taxi route data provided by ATCO in an EXPECT TAXI [taxi route] [taxi durationO] (UM305) message element and compute a taxi route path based on these data. This path is called "planned taxi route path".
Title	Extraction of EXPECT TAXI route elements
Status	<Validated>
Rationale	To comply with "RTCA SC-214 / EUROCAE WG-78 Data communications SPR" [9] requirement.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

630

631 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0003	N/A
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A

<ALLOCATED_TO>	<Project>	09.13.00	N/A
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632

633

634 [REQ]

Identifier	REQ-D-TAXI-SESAR-119-2
Requirement	After receiving a planned taxi route, the Taxi Routing function shall display it on the AMM.
Title	Graphic display of EXPECT Taxi route
Status	<Validated>
Rationale	To provide the crew with graphic information of the future possible clearance, it is displayed without crew action.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

635

636

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	Not derived from INTEROP/SPR/OSED	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

637

638

639 [REQ]

Identifier	REQ-D-TAXI-SESAR-120-3
Requirement	When the Taxi Routing function receives an EXPECT TAXI [taxi route] [taxi durationO] (UM305) message element concatenated or not with: <ul style="list-style-type: none"> • REVISED (UM249) or, • RUNWAY [runway] INTERSECTION DEPARTURE [intersection] (UM317) or, • REVISED (UM249) + RUNWAY [runway] INTERSECTION DEPARTURE [intersection] (UM317), it shall remove the previously displayed planned taxi route path (if any) and display the new route.
Title	Update of a graphic EXPECT taxi route
Status	<Validated>
Rationale	To comply with "RTCA SC-214 / EUROCAE WG-78 Data communications SPR " [9] requirement. Need confirmed by V2 evaluations. Modified to delete reqt 205.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

640

641

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0714	N/A
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0715	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

642

643

644 [REQ]

Identifier	REQ-D-TAXI-SESAR-220-1
Requirement	If the ATC Ground System provides the [runwayO] INTERSECTION

	DEPARTURE [intersection] (UM317) message element concatenated with the taxi routing information message EXPECT TAXI [taxi route] [taxi durationO] (UM305), the Taxi Routing function shall take into account the specified intersection with the departure runway for the computation of the planned taxi route path.
Title	EXPECT taxi route intersection with the runway
Status	<Validated>
Rationale	To ensure that the planned taxi route path complies with the taxi routing information message. The intersection departure is the runway entrance that will be used to line up on the runway. This information is important for the crew since it is related with aircraft performance.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

645

646 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0716	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

647

648 Revision of a planned taxi route

649

650 [REQ]

Identifier	REQ-D-TAXI-SESAR-201-1
Requirement	The Taxi Routing function shall extract the taxi route data provided by ATCO in a revision of an expected taxi route: <ul style="list-style-type: none"> REVISED (UM249) + EXPECT TAXI [taxi route] [taxi durationO] (UM305) or, REVISED (UM249) + [runway] INTERSECTION DEPARTURE [intersection] (UM317) + EXPECT TAXI [taxi route] [taxi durationO] (UM305), and compute a taxi route path based on these data.
Title	Revised EXPECT Taxi route
Status	<Validated>
Rationale	To comply with "RTCA SC-214 / EUROCAE WG-78 Data communications SPR" [28] requirement.
Category	<HMI>
Validation Method	<Real Time simulation>
Verification Method	<Test>

651

652 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0715	N/A
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

653

654

655 [REQ]

Identifier	REQ-D-TAXI-SESAR-205-1
Requirement	When the Taxi Routing function has computed a new expected taxi route path following the revision of an expected taxi route, it shall display the new

	expected taxi route path on the AMM.
Title	Display of an updated EXPECT Taxi Route
Status	<Deleted>
Rationale	Deleted because redundant with requirement -120. To comply with "RTCA SC-214 / EUROCAE WG-78 Data communications SPR" [28] requirement. The new expected taxi route may be subject to revision but not to extension.
Category	<HMI>
Validation Method	<Real Time simulation>
Verification Method	<Test>

656

657 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>		N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13	N/A

658

659

660

[REQ]

Identifier	REQ-D-TAXI-SESAR-206-1
Requirement	When the Taxi Routing function receives a revision of an expected taxi route: <ul style="list-style-type: none"> • REVISED (UM249) + EXPECT TAXI [taxi route] [taxi durationO] (UM305) or, • REVISED (UM249) + [runway] INTERSECTION DEPARTURE [intersection] (UM317) or, • REVISED (UM249) + [runway] INTERSECTION DEPARTURE [intersection] (UM317) + EXPECT TAXI [taxi route] [taxi durationO] (UM305), it shall remove from the AMM all previously displayed expected taxi route paths.
Title	Rule for updated EXPECT Taxi route
Status	<Validated>
Rationale	To comply with "RTCA SC-214 / EUROCAE WG-78 Data communications SPR" [9] requirement. Need confirmed by V2 evaluations.
Category	<HMI>
Validation Method	<Real Time simulation>
Verification Method	<Test>

661

662 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0717	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13	N/A

663

664 Remove the planned taxi route from the AMM

665

666 [REQ]

Identifier	REQ-D-TAXI-SESAR-121-1
Requirement	The Taxi Routing function shall remove the planned taxi route from the AMM when the flight crew accepts (WILCO) a taxi route clearance provided in a taxi route clearance message (UM319 or UM320).
Title	Updated Taxi route on pilot action
Status	<Deleted>
Rationale	DELETED: Following EXE-06.07.02-VP-071, when a new route is received and displayed it replaces the previous one. Once the flight crew have received and accepted a taxi clearance, they are no longer interested in the planned taxi route path because it is only informative.
Category	<HMI>
Validation Method	
Verification Method	<Test>

667

668 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>		N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13	N/A

669

670

671 [REQ]

Identifier	REQ-D-TAXI-SESAR-203-1
Requirement	The Taxi Routing function shall remove the planned taxi route path from the AMM if the flight crew responds UNABLE to the associated data link taxi route message.
Title	EXPECT Taxi route removal following UNABLE answer
Status	<Validated>
Rationale	A taxi route rejected by the flight crew is not valid anymore, then, it could be confusing to let the path displayed whereas the aircraft cannot comply with it. Need confirmed by V2 evaluations
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

672

673 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0700	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0718	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

674

675 **3.2.2.2 Cleared taxi route received via datalink**

676

677 Initial taxi route clearance

678 [REQ]

Identifier	REQ-D-TAXI-SESAR-122-2
------------	-------------------------------

Requirement	The Taxi Routing function shall extract the taxi route data provided by ATCO in a [runway] TAXI [taxi route] (UM308) message element – no REVISED (UM249) in the message – and compute a taxi route path based on these data. This path is called “cleared taxi route path”.
Title	
Status	<Deleted>
Rationale	Deleted because there is no added value compared with other requirements requiring to display the taxi route
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

679

680 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>		N/A
<ALLOCATED_TO>	<Functional block>	Communication	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

681

682

683 [REQ]

Identifier	REQ-D-TAXI-SESAR-222-2
Requirement	The Taxi Routing function shall remove any taxi route (planned or cleared, manual or datalink) previously displayed when a new taxi route has been computed.
Title	Previous cleared route removal
Status	<Validated>
Rationale	To avoid confusion with old information and keep showing current information .
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

684

685 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0715	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0717	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

686

687

688 [REQ]

Identifier	REQ-D-TAXI-SESAR-123-3
Requirement	After receiving a Cleared Taxi Route, the Taxi routing function shall display it on the AMM as a not-acknowledged route.
Title	Graphic display of cleared taxi route
Status	<Validated>
Rationale	To provide the crew with graphic information showing a new route has been received and an acknowledgment (WILCO/ROGER) is expected from the crew. Issued from Initial Package validation 2014.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

689

690 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0719	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

691

692

693 [REQ]

Identifier	REQ-D-TAXI-SESAR-124-1
Requirement	A cleared taxi route displayed on AMM shall be displayed as "Active route" after it has been acknowledged (WILCO/ROGER) by the crew. The Taxi Routing function shall modify the appearance of the cleared taxi route when the flight crew accepts this clearance (WILCO + SEND).
Title	Display of acknowledged cleared route
Status	<In Progress>
Rationale	As a consequence of REQ-D-TAXI-SESAR-123-1 : In order to show that it is accepted by the crew. This requirement had been deleted after previous evaluations and has been re-activated in 2015 during the last evaluation.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

694

695 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0719	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

696

697

698 [REQ]

Identifier	REQ-D-TAXI-SESAR-202-1
Requirement	If the ATC Ground System provides the [runwayO] INTERSECTION DEPARTURE [intersection] (UM317) message element concatenated with the taxi clearance message [runway] TAXI [taxi route] (UM308), the Taxi Routing function shall end at the specified intersection with the departure runway.
Title	Cleared route with a runway intersection
Status	<Validated>
Rationale	The route stops at the holding point fitting this intersection. The intersection departure is the runway entrance that will be used to line up on the runway. This information is important for the crew since it is related with aircraft performances.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

699

700 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0717	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

701

702

703

704 Revision of the taxi route clearance

705

706 [REQ]

Identifier	REQ-D-TAXI-SESAR-125-2
Requirement	The Taxi Routing function shall extract the taxi route data provided by ATCO in a revision of a taxi clearance: <ul style="list-style-type: none"> • REVISED (UM249) + [runway] TAXI [taxi route] (UM308) or, • REVISED (UM249) + [runway] INTERSECTION DEPARTURE [intersection] (UM317) or, • REVISED (UM249) + [runway] INTERSECTION DEPARTURE [intersection] (UM317) + [runway] TAXI [taxi route] (UM308), to compute and display a taxi route path based on these data.
Title	Uplink messages for a Revised cleared taxi route
Status	<Validated>
Rationale	Process Revised routes messages
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

707

708 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0716	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0717	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

709

710

711 [REQ]

Identifier	REQ-D-TAXI-SESAR-126-2
Requirement	When the Taxi Routing function has computed a (new) cleared taxi route path following the revision of a taxi clearance, it shall display the new cleared taxi route path on the AMM.
Title	Updated display of a cleared taxi route
Status	<Deleted>
Rationale	To comply with "RTCA SC-214 / EUROCAE WG-78 Data communications SPR M" [9] requirement. Redundant with REQ-D-TAXI-SESAR-208-2
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

712

713 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>		N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

714

715 [REQ]

Identifier	REQ-D-TAXI-SESAR-127-1
Requirement	In case the previous taxi route was not accepted by the flight crew, the D-TAXI function shall remove it from the AMM as soon as the revision message is received. Otherwise, the D-TAXI function shall determine and display on the AMM, in a distinctive way, the following parts of route: <ul style="list-style-type: none"> ➤ Part of the revised route that is included in the previously cleared route. ➤ Part of the revised route that is <u>not</u> included in the previously cleared route. <p>Obsolete part of the previously cleared route (i.e. parts not included in the revised route)</p>
Title	
Status	<Deleted>
Rationale	Following EXE-06.07.02-VP-071, this requirement is obsolete.[23]
Category	<HMI>
Validation Method	
Verification Method	<Test>

716

717 [REQ]

Identifier	REQ-D-TAXI-SESAR-128-2
Requirement	A revised taxi route displayed on AMM shall be displayed as "Active route" after it has been acknowledged (WILCO/ROGER) by the crew. The Taxi Routing function shall modify the appearance of the revised cleared taxi route when the flight crew accepts this revised clearance (WILCO + SEND).
Title	Display of an acknowledged revised route
Status	<In Progress>
Rationale	Re-opened after Nov. 2014 evaluations.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

718

719 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0715	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

720

721 [REQ]

Identifier	REQ-D-TAXI-SESAR-129-1
Requirement	When the flight crew accepts a revised taxi clearance (WILCO + SEND) and if the obsolete part of the previously cleared route is displayed, the Taxi Routing function shall remove it from the AMM.
Title	Display of Revised taxi route
Status	<Deleted>
Rationale	See reqt 208-2 hereafter
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

722

723

[REQ]

Identifier	REQ-D-TAXI-SESAR-208-2
Requirement	When the Taxi Routing function receives a revision of a taxi clearance: <ul style="list-style-type: none"> • REVISED (UM249) + [runway] TAXI [taxi route] (UM308) or, • REVISED (UM249) + [runway] INTERSECTION DEPARTURE [intersection] (UM317) or, • REVISED (UM249) + [runway] INTERSECTION DEPARTURE [intersection] (UM317) + [runway] TAXI [taxi route] (UM308), the revised taxi route displayed on AMM shall be displayed in a way such that it makes the route change visible to the crew before it is acknowledged (WILCO/ROGER).
Title	Revised taxi route
Status	<In Progress>
Rationale	To detect and understand the change between former and current route.
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

724

725

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0715	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0716	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0717	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

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727

728 Continuation (Extension of taxi route) of a partially cleared route

729

730

[REQ]

Identifier	REQ-D-TAXI-SESAR-130-3
Requirement	When the Taxi Routing function receives a taxi clearance without revision message: <ul style="list-style-type: none"> • [runway] TAXI [taxi route] (UM308) or, • [runway] INTERSECTION DEPARTURE [intersection] (UM317) concatenated with [runway] TAXI [taxi route] (UM308), without REVISED (UM249) and when a taxi clearance is already displayed, it shall display the new path and remove the previously displayed cleared taxi route paths. This path is called "a route continuation".
Title	Display of a route continuation
Status	<Validated>
Rationale	To keep graphic display simple
Category	<Interoperability>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

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732

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0717	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

733

734

735 Remove the cleared taxi route from the AMM

736

737 [REQ]

Identifier	REQ-D-TAXI-SESAR-204-1
Requirement	The Taxi Routing function shall remove the cleared taxi route path from the AMM if the flight crew responds UNABLE to the associated data link taxi route message.
Title	Taxi route removal in case of UNABLE
Status	<Validated>
Rationale	A taxi route rejected by the flight crew is not valid anymore, then, it could be confusing to let the former path displayed whereas the aircraft cannot comply with it. Need confirmed by V2 evaluations.
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

738

739 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-DTXI.0700	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

740

741

742 **3.2.2.3 Manual Taxi route**

743 [REQ]

Identifier	REQ-D-TAXI-SESAR-131-2
Requirement	The Taxi Routing function shall compute a taxi route path based on pilots input data. This path is called "manual taxi route path".
Title	Need for Manual taxi route entry
Status	<In progress>
Rationale	To improve flight crew awareness and to answer pilot need concerning the manually inserted taxi route.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

744

745 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0800.0000	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

746

747

748 [REQ]

Identifier	REQ-D-TAXI-SESAR-132-2
Requirement	The Taxi Routing function shall display on the AMM the manual taxi route path when it has computed it.
Title	Graphical display of manual taxi route
Status	<Validated>
Rationale	To answer pilot need concerning the display of a manually inserted taxi route.
Category	<HMI>

Validation Method	<Real Time Simulation>
Verification Method	<Test>

749

750 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0800.0000	N/A
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

751

752

3.2.2.4 Planned / Cleared route differentiation

753

754 [REQ]

Identifier	REQ-D-TAXI-SESAR-223-1
Requirement	The Taxi Routing function shall display the cleared taxi route path and the planned/prepared taxi route path in a distinctive manner.
Title	Planned/Cleared route differentiation
Status	<In Progress>
Rationale	The status differentiation supports pilots' awareness of the type of route displayed and reduces the potential risk to confuse it: expected/prepared route (taxi is not allowed) or cleared route (taxi is allowed).
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

755

756 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0800.0001	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0800.0002	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

757

758

759

3.2.2.5 Handle taxi route display during aircraft movement

760 [REQ]

Identifier	REQ-D-TAXI-SESAR-133-2
Requirement	The Taxi Routing function shall remove the part of a taxi route path that has been passed as the aircraft moves along this route or when the aircraft is joining the route via an intersecting route.
Title	Taxi route display management during aircraft movement
Status	<Validated>
Rationale	Decluttering the display by removing portions of taxiways sequenced by the aircraft helps providing a clear and unambiguous display of the taxi route to the crew. It is consistent with general navigation display principles (F-PLN behavior). The requirement applies even when the aircraft is moving back in the case of a pushback.
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

761

762 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
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<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0000	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

763

764 **3.2.2.6 Taxi route computation requirements**

765

766 [REQ]

Identifier	REQ-D-TAXI-SESAR-134-1
Requirement	The D-TAXI function computes a taxi route based on data provided in a datalink taxi route message (UM315, UM319 or UM320) or manual input by the flight crew. These data are referred to as "route input data" in this paragraph.
Title	
Status	<Deleted>
Rationale	To comply with SRP requirements [9] DELETED: already covered in planned, cleared and manual requirements with: Expected REQ-D-TAXI-SESAR-037-1 EXP REQ-D-TAXI-SESAR-049-1 INTER REQ-2-TAXI-SESAR-014-1 REV Cleared REQ-D-TAXI-SESAR-040-1 CLEA REQ-D-TAXI-SESAR-050-1 INTER REQ-D-TAXI-SESAR-044-1 REV Manual REQ-D-TAXI-SESAR-077-1
Category	<Functional>
Validation Method	<Real Time Simulations>
Verification Method	<Test>

767

768

769 Conformance to the controller instruction

770 [REQ]

Identifier	REQ-D-TAXI-SESAR-135-2
Requirement	The Taxi Routing function shall compute a taxi route that goes along all the taxiways provided as input (data link or pilot input).
Title	Taxi route computation rule (1)
Status	<Validated>
Rationale	To get with the highest probability the most suitable operational route despite the high number of available routes.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

771

772 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0002	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

773

774 [REQ]

Identifier	REQ-D-TAXI-SESAR-136-2
Requirement	The Taxi Routing function shall respect the sequence of taxiways provided in the route input data to compute the taxi route.
Title	Taxi route computation rule (2)
Status	<Validated>
Rationale	To get with the highest probability the most suitable operational route despite the high number of available routes.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

775

776 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0002	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

777

778 [REQ]

Identifier	REQ-D-TAXI-SESAR-137-1
Requirement	The computed taxi route shall not go along a runway or cross a runway unless it is part of the route input data.
Title	
Status	<Deleted>
Rationale	To follow ATC instructions DELETED: The ATC shall not send clearance crossing a runway with data link but the pilot input or a taxi route preparation may cross the runway. (But the route is not highlighted above the runway)
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

779

780

781 [REQ]

Identifier	REQ-D-TAXI-SESAR-138-2
Requirement	When possible, the Taxi Routing function should compute a taxi route that avoids going along taxiways that are not part of the route input data.
Title	Taxi route computation rule (3)
Status	<Validated>
Rationale	To get with the highest probability the most suitable operational route despite the high number of available routes. In the case of discontinuities between the given taxi route elements, the system may add system elements to make a continuous route. They are called "system added elements". Some logics should be implemented to get the most operational route result.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

782

783 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0002	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

784

785 [REQ]

Identifier	REQ-D-TAXI-SESAR-139-1
Requirement	If the computed taxi route goes along a taxiway that is not part of the route input data, the Taxi Routing function shall display this part of the taxi route in a distinctive way.
Title	
Status	<Deleted>
Rationale	DELETED: Following EXE-06.07.02-VP-071, this requirement is obsolete.[23]
Category	<HMI>
Validation Method	
Verification Method	<Test>

786

787 Realistic taxi route path

788

789 [REQ]

Identifier	REQ-D-TAXI-SESAR-140-2
Requirement	The taxi route path should be compliant with the guidance lines (on airport surface elements) displayed on the AMM.
Title	Guidance lines
Status	<Validated>
Rationale	The aim is to display taxi route path which is consistent with taxi operation and in accordance with the AMM layout and ownship representation. To reach this objective, it implies to have taxi lanes available in AMDBs.
	If several taxilines are available on the same taxiway, the Taxi Routing function should be able to follow each of them according to the route (see REQ-D-TAXI-SESAR-218-1).
Category	<HMI>
Validation Method	<Real Time simulation>
Verification Method	<Test>

790

791 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0003	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

792

793

794 [REQ]

Identifier	REQ-D-TAXI-SESAR-225-1
Requirement	When a taxiway contains several guidance lines, the Taxi Routing function should take into account the guidance line specified in the data link message for a data link taxi route when it is available.
Title	Taxiway guidance lines
Status	<Validated>
Rationale	The aim is to display taxi route path which is consistent with taxi operation and in accordance with the AMM layout and aircraft ownship representation. If several taxiway guidance lines are available on the same taxiway, the Taxi Routing function should be able to follow each of them according to the route. When the taxiway guidance line is not specified in the data link message or in case of manual taxi route input, the shortest route path rule should apply.
Category	<HMI>
Validation Method	<Real Time simulation>

Verification Method	<Test>
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796 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0003	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

797

798

799 [REQ]

Identifier	REQ-D-TAXI-SESAR-141-2
Requirement	The taxi route path shall be consistent with the direction in which the aircraft is moving during push-back.
Title	Consistency between route and aircraft heading
Status	<Validated>
Rationale	The aim is to display taxi route path which is consistent with taxi operation and in accordance with the AMM layout and ownship representation. In the case of aircraft pushback, the aircraft is moving in the opposite direction of its heading. The former requirement was split into 2 requirements (141 and 229)
Category	<HMI>
Validation Method	<Real Time simulation>
Verification Method	<Test>

800

801 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0004	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

802

803 [REQ]

Identifier	REQ-D-TAXI-SESAR-229-1
Requirement	The taxi route path should be consistent with the capability for maneuvering of aircraft on the airport surface.
Title	Consistency between route and aircraft maneuvering capability
Status	<In progress>
Rationale	The aim is to display taxi route path which is consistent with taxi operation and in accordance with the AMM layout and ownship representation. During taxi, the displayed route must be consistent with maneuvering capabilities during turns.
Category	<HMI>
Validation Method	<Real Time simulation>
Verification Method	<Test>

804

805 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0004	<Full>
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

806

807

808 [REQ]

Identifier	REQ-D-TAXI-SESAR-200-1
Requirement	The Taxi Routing function shall respect way of circulation (on one way taxiway).
Title	Sense of circulation
Status	<Validated>
Rationale	The system should not propose route solution using wrong way to the pilot for safety reasons. Added elements are added by the system to possibly complete discontinuities of route input data.
Category	<Functional>
Validation Method	<Real Time simulation>
Verification Method	<Test>

809
810

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0004	<Full>
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

811
812

813 [REQ]

Identifier	REQ-D-TAXI-SESAR-227-1
Requirement	When the aircraft is on the movement area, the Taxi Routing function shall display the computed taxi route path starting from the current position of the aircraft and ending at its destination point.
Title	Taxi route display when aircraft is on ground
Status	<In progress>
Rationale	When the aircraft is on the movement area, the taxi route path should always start at the aircraft current position.
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

814
815

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0000	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

816
817818 **3.2.2.7 Failure to compute a taxi route**819
820

[REQ]

Identifier	REQ-D-TAXI-SESAR-142-2
Requirement	In case the Taxi Routing function is not able to compute a taxi route based on data provided in : <ul style="list-style-type: none"> - data link taxi route (cleared or EXPECT): <ul style="list-style-type: none"> o - or manual input by the flight crew, the Taxi Routing function shall provide an error message.
Title	Failure to compute a taxi route

Status	<Validated>
Rationale	To indicate to the flight crew that the taxi route cannot be displayed. The message can propose an alternative action like inserting spaces if in Manual mode.
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

821

822 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0006	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

823

824 [REQ]

Identifier	REQ-D-TAXI-SESAR-231-1
Requirement	In case the Taxi Routing function identifies ambiguities (e.g. several possible routes matching with the manual or datalink input) that cannot be solved to provide a single route display with certainty, it shall advise the crew with a message.
Title	Failure to compute a taxi route
Status	<Validated>
Rationale	To avoid presenting a default route that can be erroneous.
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

825

826 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0006	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13	N/A

827

828

829

3.2.2.8 Display the route path textually

830

831 The following requirements have been deleted following evaluations performed in 2015 with the initial
832 package OANS prototype. It has been concluded that adding the text version on the same display as
833 the graphic display of the taxi route was useless.

834 [REQ]

Identifier	REQ-D-TAXI-SESAR-143-2
Requirement	For each taxi route path computed and displayed on the AMM, the Taxi Routing function shall extract the sequence of names of the airport surface elements that make up the entire taxi route and display it textually (taxi route navigation helper).
Title	
Status	<Deleted>
Rationale	Deleted because the helper on ND is of no help to pilots (eval. Nov. 2014)
Category	<HMI>
Validation Method	<Real Time Simulation>

Verification Method	<Test>
---------------------	--------

835

836

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0007	<Full>
<ALLOCATED_TO>	<Functional block>	Communication - A/G datalink – CPDLC - Displays & Controls - Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

837

838

[REQ]

Identifier	REQ-D-TAXI-SESAR-144-2
Requirement	The Taxi Routing function shall remove from the taxi route navigation helper the names of elements that the aircraft has passed as it moves along this route.
Title	
Status	<Deleted>
Rationale	Deleted because of no help to pilots
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

839

840

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0008	<Full>
<ALLOCATED_TO>	<Functional block>	Communication - A/G datalink – CPDLC - Displays & Controls - Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

841

842

843

[REQ]

Identifier	REQ-D-TAXI-SESAR-219-1
Requirement	The Taxi Routing function shall continuously maintain the consistency between the taxi route graphical path and the textual taxi route navigation helper in lower banner.
Title	
Status	<Deleted>
Rationale	Deleted because of textual taxi route on ND was considered as not used by pilots (evaluation 2015).
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

844

845

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0009	<Full>
<ALLOCATED_TO>	<Functional block>	Communication Displays & Controls - Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

846

847 **3.2.3 MF3: Manage a taxi route**848 **3.2.3.1 Build a manual taxi route**

849

850 Create / Replace a taxi route

851

852 [REQ]

Identifier	REQ-D-TAXI-SESAR-148-2
Requirement	The Taxi Routing function shall enable the flight crew to create a taxi route based on the taxi clearance communicated by voice by the controller or based on pilot route preparation.
Title	Need for Manual Taxi route
Status	<Validated>
Rationale	Building a manual route would allow pilots to benefit from the route path display as a support for navigation, when data link is not available on the airport or before data link implementation or simply for preparation purpose. This requirement is close to reqt -131-.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

853

854 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0800.0000	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

855

856

857 [REQ]

Identifier	REQ-D-TAXI-SESAR-149-2
Requirement	The Taxi Routing function shall enable the flight crew to create a taxi route that replaces the existing taxi route (either it was previously received by data link or manually inserted) by allowing new input of the sequence of taxiways that make up the taxi route.
Title	Manual update of a taxi route
Status	<Validated>
Rationale	The aim is to make it easy to replace the existing taxi route by a new one. It permits to handle the revision of the taxi route by the ATCO.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

858

859 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0800.0000	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

860

861

3.2.3.2 ERASE taxi route information

862

[REQ]

Identifier	REQ-D-TAXI-SESAR-147-3
Requirement	The Taxi Routing function shall enable the flight crew to erase any taxi route path displayed on the AMM.
Title	Taxi route erasing
Status	<Validated>
Rationale	The aim is to enable the flight crew to erase a data link taxi route path in case the ATCO modifies the route via R/T. It avoids displaying obsolete information on the AMM. In the case of a manual taxi route it enables the flight crew to discard obsolete or incorrect information.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

863

864

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0010	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

865

866

867

[REQ]

Identifier	REQ-D-TAXI-SESAR-151-1
Requirement	The Taxi Routing function shall enable the flight crew to erase the existing manual taxi route (removed from the AMM).
Title	
Status	<Deleted>
Rationale	DELETED: Merge with REQ-D-TAXI-SESAR-147-2
Category	<HMI>
Validation Method	
Verification Method	<Test>

868

869

870

[REQ]

Identifier	REQ-D-TAXI-SESAR-209-2
Requirement	The Taxi Routing function shall remove any taxi route path displayed on the AMM when the ground/flight phase changes to FLIGHT (support to TAXI-OUT is finished) or at transition from FLIGHT to GROUND (support to TAXI-IN is finished, a new flight begins).
Title	Taxi route erasing after take-off
Status	<Validated>
Rationale	After a flight has been completed and the crew prepares a new flight all taxi routes previously displayed have become obsolete and have to be removed so as not to disturb the crew. In the same way, when support to TAXI-OUT is finished, it is necessary to clean all taxi routes from the departure airport AMM in case the flight returns on this airport (circular flight or in case of emergency).
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

871
872

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0011	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

873
874
875

[REQ]

Identifier	REQ-D-TAXI-SESAR-210-1
Requirement	When the flight crew selects the ERASE action - on the HMI dedicated to create or modify a manual taxi route - the Taxi Routing function shall erase the existing taxi route (either data link or manually inserted) by removing the taxi route path from the AMM.
Title	ERASE action
Status	<Validated>
Rationale	Erasing the route means that this one is not valid anymore or not necessary anymore on the AMM, then when pilots perform this action, they expect that any associated display is deleted from the system, to avoid any confusion about the clearance and ensure a consistency of information displayed in the cockpit.
Category	<HMI>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

876
877

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0900.0010	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

878

879 **3.2.3.3 Confirm a Taxi Route**

880

881 [REQ]

Identifier	REQ-D-TAXI-SESAR-211-1
Requirement	The Taxi Routing function shall differentiate the status of the manual taxi route between: <ul style="list-style-type: none"> • "PREPARED" (manually) or "EXPECT" (received by datalink) when the route has been created or modified, • "CLEARED" upon dedicated pilot action.
Title	Difference between taxi route statuses
Status	<Validated>
Rationale	The status differentiation supports pilots' awareness of the type of route displayed and reduces the potential risk to confuse it: expected/prepared route (taxi is not allowed) or cleared route (taxi is allowed). The result is that, on the graphical representation, each type has a specific colour.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

882
883

[REQ Trace]

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Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0800.0001	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0800.0002	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

884

885 3.3 Adaptability

886 Adaptability is contained in Requirement 218-1 that deals with possible system configurations that
887 provide more or less services to the pilots.

888 3.4 Performance Characteristics

889 [REQ]

Identifier	REQ-D-TAXI-SESAR-230-1
Requirement	The time between Taxi Route entry (considered from a manual entry or when a datalink message is displayed to the crew) into MF2 (Compute and display a Taxi Route) and Taxi Route display shall be such that: <ul style="list-style-type: none"> - the mean time is less than 2s, - the maximum time is less than 10s.
Title	Time performance.
Status	<Validated>
Rationale	In order to provide the graphical information within a reasonable time for users. In case of complex routes, a computation duration of up to 5s could be acceptable.
Category	<Functional>
Validation Method	<Real Time Simulation>
Verification Method	<Test>

890

891 [REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-OSED-0800.0000	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-DTXI.0719	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.07.02-DTXI.0724	<Full>
<ALLOCATED_TO>	<Functional block>	Displays & Controls	N/A
<ALLOCATED_TO>	<Functional block>	Databases	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA04.02.01	N/A
<ALLOCATED_TO>	<Project>	09.13.00	N/A

892

893 3.5 Safety & Security

894 Safety objectives at aircraft level are derived from the ones that have been defined in SPR ref. [28]
895 and [25]. Such a study is not part of this document.

896 Security is not part of associated SPR.

897 3.6 Maintainability

898 N/A

899 Maintainability is not part of an FRD.

900 3.7 Reliability

901 N/A

902 Reliability is not part of an FRD.

903 3.8 Functional block Internal Data Requirements

904 Refer to section 3.2 that provides requirements for D-Taxi functions MF1, MF2, MF3. Functional
905 blocks requirements

906 3.9 Design and Construction Constraints

907 N/A

908 Design and construction constraints are not part of an FRD.

909 3.10 Functional block Interface Requirements

910 N/A

911 Interfaces are not part of an FRD.

912 Datalink messages Information can be found in project 06.07.03 Interop document D65 (ref.[20]).
913 Messages are reminded in the Appendix A hereafter.

914

915

916

917 4 Assumptions

918 Assumptions (hypotheses) are identified as follows: FRD-HYP-D-TAXI-SESAR-“hyp. number”-“hyp.
919 Version”-“deliverable number”.

920 The hypothesis version is 1 when it is created and is incremented when the hypothesis is modified.

921

922 4.1 Operations

923

924 ~~FRD-HYP-D-TAXI-SESAR-1-1~~ (former FRD-D-TAXI-001-1)

925 It is assumed that data link communication is not the primary medium for Air/Ground communication,

926 DELETED: CPDLC requirement.

927

928 **FRD-HYP-D-TAXI-SESAR-2-1-D02** (former FRD-HYP-D-TAXI-2-1)

929 It is assumed that data link ground cleared/planned taxi routes issued by the ATC shall have a level of
930 detail sufficient to ensure that the cleared/planned route is unique and unambiguous when referenced
931 to Airport Map features.

932 LINK TO: REQ-06.07.03-INTEROP-DTAX.0003; REQ-06.07.02-OSED-DTXI.0002

933

934 **FRD-HYP-D-TAXI-SESAR-3-1-D02** (former FRD-HYP-D-TAXI-3-1)

935 It is assumed that the flight crew will keep the current crew task sharing during Taxi-Out and Taxi-In
936 phases when the aircraft is on ground e.g. (it may vary according to the airline):

- 937
- 938 • PF manages taxi while PM manages communications.
 - 939 • PF main task is to look outside and PM to consolidate information depicted on moving map
940 with the outside view.
 - 941 • PM manages navigation.

941

942 **FRD-HYP-D-TAXI-SESAR-04-1-D02** (former FRD-HYP-D-TAXI-4-1)

943 It is assumed that the ATC shall issue runway crossing clearances by voice.

944

945 ~~FRD-HYP-D-TAXI-SESAR-05-1~~ (former FRD-HYP-D-TAXI-5-1)

946 It is assumed that the ATC shall issue time critical clearances by voice.

947 DELETED: Not sufficient and accurate enough like assumption -04-

948

949 **FRD-HYP-D-TAXI-SESAR-20-1-D03**

950 The A-SMGCS Routing and Planning function shall avoid the uplink of the expected taxi route to the
951 flight crew issued too close to the TLDT/TSAT (i.e. TLDT-15 and TSAT-10).

952 LINK TO: REQ-06.07.02-OSED-DTXI.0001

953

954 **FRD-HYP-D-TAXI-SESAR-30-1-D03**

955 The A-SMGCS Routing and Planning function shall allow the provision of a HOLD instruction via data
956 link to stationary aircraft only.

957 LINK TO: REQ-06.07.02-OSED-DTXI.0008

958

959 **FRD-HYP-D-TAXI-SESAR-21-1-D03**

960 It is assumed that no specific training is required to use the Taxi Routing function.

961 LINK TO: REQ-06.07.02-OSED-RGTR.0001

962

963 **FRD-HYP-D-TAXI-SESAR-22-1-D03**

964 The rules on D-TAXI message sequences shall be as described in WG-78/SC-214 interoperability
965 document [10].

966 LINK TO: REQ-06.07.03-INTEROP-DTAX.0012

967

968 **FRD-HYP-D-TAXI-SESAR-24-1-D03**

969 Flight Crew initiating D-TAXI **pushback** request shall operate as shown in in Interim OSED [22].

970

971 **FRD-HYP-D-TAXI-SESAR-25-1-D03**

972 Flight Crew initiating D-TAXI **taxi-out** request shall operate as shown in in Interim OSED [22].

973

974 **FRD-HYP-D-TAXI-SESAR-26-1-D03**

975 Flight Crew initiating D-TAXI **taxi-in** request shall operate as shown in in Interim OSED [22].

976

977 **FRD-HYP-D-TAXI-SESAR-27-1-D03**

978 Flight Crew initiating D-TAXI **revision** request shall operate as shown in Interim OSED [22].

979

980 **FRD-HYP-D-TAXI-SESAR-28-1-D03**

981 Flight Crew initiating D-TAXI **start-up** request shall operate as shown in "OFA04.02.01 Interim OSED"
982 [22].

983 LINK TO: REQ-06.07.02-OSED-DTXI.0011

984

985 **FRD-HYP-D-TAXI-SESAR-29-1-D03**

986 AMDBs used by Taxi Routing function shall be updated following the AIRAC cycle.

987

988 **FRD-HYP-D-TAXI-SESAR-30-1-D03**

989 For interoperability purpose, Taxi routing information (e.g. Routes, Clearances) shared between the
990 flight crew and the ATCO shall be based on AIP of the current following the AIRAC cycle.

991

992

993 **4.2 Interface with the Air Traffic Control System**

994

- 995 ~~FRD-HYP-D-TAXI-SESAR-06-1~~ (former ~~FRD-HYP-D-TAXI-6-1~~)
- 996 It is assumed that in case of change to the planned taxi route the Air Traffic Control System sends
997 UM305 (EXPECT TAXI) again without UM249 (REVISED).
- 998 DELETED: Not only REVISED+EXPECTED is allowed
- 999
- 1000 **FRD-HYP-D-TAXI-SESAR-07-1-D03**
- 1001 It is assumed that the ATC Ground System provides information on the category of the holding point
1002 to be used in case this category is not CATI.
- 1003
- 1004 **FRD-HYP-D-TAXI-SESAR-08-1-D03**
- 1005 It is assumed that a message containing the EXPECT TAXI [taxi route] [taxi durationO] (UM305)
1006 element does not contain the HOLD SHORT [ground location] (UM318) element because it is not
1007 needed for planning and might confuse the flight crew. The HOLD SHORT [ground location] (UM318)
1008 element should only be present in a clearance message.
- 1009
- 1010 **FRD-HYP-D-TAXI-SESAR-09-1-D03**
- 1011 It is assumed that when a data link taxi clearance message contains the REVISED [revision reasonO]
1012 (UM249) element then the taxi route that is provided begins at the aircraft present position and
1013 includes, as a minimum, the taxi route to the clearance limit (see §3.6.2.1 "RTCA SC-214 / EUROCAE
1014 WG-78 Data communications SPR" [9] req. DTAXI-OR 1).
- 1015
- 1016 **FRD-HYP-D-TAXI-SESAR-10-1-D03**
- 1017 It is assumed that when a data link taxi clearance message contains the REVISED [revision reasonO]
1018 (UM249) element the taxi route that is provided is a modification of a previous clearance. Conversely,
1019 if the REVISED [revision reasonO] (UM249) element is absent, the taxi route that is provided is the
1020 first clearance or a continuation (an extension) of a previous clearance.
- 1021
- 1022 **FRD-HYP-D-TAXI-SESAR-11-1-D03**
- 1023 It is assumed that the taxi route information contained in an EXPECT TAXI [taxi route] [taxi durationO]
1024 (UM305) message element completely replaces previously taxi route information received (if any).
- 1025
- 1026 **FRD-HYP-D-TAXI-SESAR-12-1-D03**
- 1027 It is assumed that ground systems databases are consistent with AIP from current AIRAC cycle
1028 information.
- 1029
- 1030 **FRD-HYP-D-TAXI-SESAR-13-1-D03**
- 1031 It is assumed that arrival taxi information (EXPECT) is sent before the aircraft has started its descent
1032 ("RTCA SC-214 / EUROCAE WG-78 Data communications SPR" [28] §3.6.3.2).
- 1033

1034 **FRD-HYP-D-TAXI-SESAR-14-1-D03**

1035 It is assumed that a taxi-in clearance after leaving the runway when the aircraft is transferred from
1036 runway controller to ground controller ("RTCA SC-214 / EUROCAE WG-78 Data communications
1037 SPR" [28] §3.6.3.2).

1038

1039 **FRD-HYP-D-TAXI-SESAR-15-1-D03**

1040 It is assumed that a data link taxi clearance is not provided after the aircraft has reached the
1041 departure holding point (see "RTCA SC-214 / EUROCAE WG-78 Data communications SPR" [9]
1042 §3.6.1).

1043

1044 **FRD-HYP-D-TAXI-SESAR-16-1-D03**

1045 It is assumed that during a taxi phase, the ATC shall not send a taxi routing (EXPECT) information
1046 when a cleared taxi route has been previously received by the crew.

1047

1048 **FRD-HYP-D-TAXI-SESAR-17-1-D03**

1049 It is assumed that a RUNWAY [runway] INTERSECTION DEPARTURE [intersection] (UM317)
1050 message element is always concatenated with a taxi route message element RUNWAY [runway]
1051 TAXI [taxi route] (UM308) or EXPECT TAXI [taxi route] [taxi durationO] (UM305).

1052

1053 **FRD-HYP-D-TAXI-SESAR-18-1-D03**

1054 It is assumed that an EXPECT TAXI [taxi route] [taxi durationO] (UM305) or RUNWAY [runwayO]
1055 TAXI [taxi route] (UM308) message element contains zero or one "TO location". In case there is no
1056 "TO location", it is assumed to contain a "VIA location".

1057

1058 **FRD-HYP-D-TAXI-SESAR-19-1-D03**

1059 It is assumed that an EXPECT TAXI [taxi route] [taxi durationO] (UM305) message element contains
1060 zero or one "FROM location". In case there is no "FROM location", it is assumed to contain a "VIA
1061 location".

1062

1063 **FRD-HYP-D-TAXI-SESAR-23-1-D03**

1064 It is assumed that the ground airport database is compatible with the onboard database.

1065 LINK TO: REQ-06.07.03-INTEROP-DTAX.0004

1066

1067

1068

5 References

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1121 5.1 Use of copyright / patent material /classified material

1122 N/A

1123

1124 **Appendix A : CPDLC messages set**

1125 Those tables 1 and 2 are extracted from the “RTCA SC-214 / EUROCAE WG-78 Data
1126 communications SPR ” [28] table 5-5 CPDLC UPLINK MESSAGE ELEMENTS and give the list of D-
1127 TAXI data link messages.

1128 They have been subject to discussion. For more details, it will be referred to Interim OSED [22]. For
1129 each message the corresponding response attributes are indicated in the last column (refer to the
1130 said SPR document for more details):

- 1131 - N stands for NEGATIVE
- 1132 - W for WILCO
- 1133 - U for UNABLE
- 1134 - R for ROGER
- 1135 - A for AFFIRM
- 1136 - Y for YES

1137 **Table 1: D-TAXI Uplink Message elements**

<i>Msg ID</i>	<i>Message element</i>	<i>Message intent/use</i>	<i>Response</i>
UM0	UNABLE	Indication that the message cannot be complied with.	N
UM1	STANDBY	Indication that the message will be responded to shortly.	N
UM2	REQUEST DEFERRED	Indication that a long term delay in response can be expected.	N
UM73R	[<i>departure clearanceR</i>]	Instruction to proceed via the specified departure clearance.	W/U
UM143	CONFIRM REQUEST	Request to confirm the referenced request since the initial request was not understood. The request should be clarified and resubmitted.	N
UM159R	ERROR [<i>error informationR</i>]	System-generated notification of an error.	N
UM162	MESSAGE NOT SUPPORTED BY THIS ATC UNIT	System-generated notification that received message is not supported.	N
UM164	WHEN READY	Indication that the associated instruction is to be executed when the flight crew is ready.	N
UM169	[<i>free text</i>]		R
UM177	AT PILOTS DISCRETION	Indication that the associated instruction will be executed when the flight crew is prepared to do so.	N
UM183	[<i>free text</i>]		N
UM187	[<i>free text</i>]		N
UM218	REQUEST ALREADY RECEIVED	Indication that the request has already been received.	N
UM227	LOGICAL ACKNOWLEDGMENT	System generated notification that the received message is acceptable for display.	N
UM248	REST OF CLEARANCE UNCHANGED	Indication that after the modification in the associated instruction, the rest of the clearance is unchanged.	A
UM249	REVISED [<i>revision reasonO</i>]	Indication that the associated instruction is either a revision to a previously issued instruction or is different from the requested route/oceanic clearance.	N

<i>Msg ID</i>	<i>Message element</i>	<i>Message intent/use</i>	<i>Response</i>
UM264	EXPECT [<i>level single</i>] [<i>number of minutes</i>] AFTER DEPARTURE	Notification that a clearance may be issued for the aircraft to commence a climb to the specified level at the specified number of minutes after departure.	R
UM266	AT [<i>position ATW</i>] CLEARED TO [<i>positionR</i>] VIA [<i>route clearanceR</i>]	Instruction to proceed from the first specified position to the second specified position via the specified route.	W/U
UM270	EXPECT [<i>clearance typeR</i>] [<i>assigned time</i>]	Notification that the specified clearance type may be issued at the time required to meet the specified time.	R
UM283	WHEN CAN YOU ACCEPT [<i>clearance typeR</i>]	Request for the earliest time or position at which the specified clearance can be accepted.	Y
UM302	START-UP APPROVED [<i>assigned timeO</i>]	Instruction that engine startup is approved. A time for start-up may be specified.	W/U
UM303	CANCEL STARTUP	Instruction to cancel engine startup.	W/U
UM304	PUSHBACK APPROVED [<i>pushback positionO</i>] [<i>assigned timeO</i>]	Instruction to commence pushback. A pushback position(s) and direction, and/or time may be specified.	W/U
UM305	EXPECT TAXI [<i>taxi route</i>] [<i>taxi durationO</i>]	Notification that a taxi clearance may be issued for the specified taxi route. The estimated taxi duration may be specified.	R
UM306	RESUME TAXI [<i>taxi resume conditionO</i>]	Instruction to resume a previously issued taxi that was interrupted. The conditions for resuming the taxi may be specified.	W/U
UM307	CROSS [<i>ground location</i>]	Instruction to cross the specified ground location.	W/U
UM308	RUNWAY [<i>runwayO</i>] TAXI [<i>taxi route</i>]	Instruction to taxi to the specified location; may include a hold short position.	W/U
UM309	DE-ICING APPROVED	Indication the de-icing is approved	N
UM310	WHEN REACHING [<i>ground location</i>]	Indication that the associated instruction commences when the specified ground location is reached.	N
UM311	HOLD POSITION	Instruction to hold the current position	W/U
UM312	FOR DE-ICING	Indication that the associated instruction is issued in order to perform de-icing.	N
UM313	CAN YOU ACCEPT INTERSECTION [<i>intersection</i>] FOR DEPARTURE RUNWAY [<i>runway</i>]	Request to indicate whether or not the specified intersection can be accepted on the specified departure runway.	A/N
UM314	DEPARTURES STOPPED	Indication that departures have been stopped.	N
UM315	ENGINE SHUTDOWN PERMITTED	Indication that engine shutdown is permitted.	N
UM316	CANCEL HOLD [<i>ground location distance-ground</i>] AVAILABLE	Instruction to cancel a hold at the specified position Indication of the remaining length of the runway for the associated intersection departure instruction.	N
UM317	RUNWAY [<i>runwayO</i>] INTERSECTION DEPARTURE [<i>intersection</i>]([<i>distance ground availableO</i>])AVAILABLE	Indication of the intersection departure for the associated taxi instruction or taxi route information and may include the remaining length of the runway.	N
UM318	HOLD SHORT [<i>ground location</i>]	Instruction to hold short of the specified ground location.	W/U
UM320	MESSAGE RECEIVED TOO LATE, RESEND MESSAGE OR CONTACT BY VOICE	Indication that the received message has a latency greater than the required latency	N

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Table 2: D-TAXI Downlink Message elements

Message ID	Message Element	Message intent/use	Response
DM0	WILCO	Indication that the instruction will be complied with.	N
DM1	UNABLE	Indication that the instruction cannot be complied with.	N
DM2	STANDBY	Indication that the message will be responded to shortly.	N
DM3	ROGER.	Indication that the message is understood.	N
DM4	AFFIRM	Indication of a positive response to a message.	N
DM5	NEGATIVE	Indication of a negative response to a message.	N
DM25R	REQUEST [clearance type request] CLEARANCE	Request for the specified clearance.	Y
DM62R	ERROR [error informationR]	System-generated notification of an error.	N
DM65	DUE TO [due to reason]	Indication of the reason for the associated message.	N
DM97	[free text]		N
DM98	[free text]		N
DM100	LOGICAL ACKNOWLEDGMENT	System-generated notification that the received message is acceptable for display.	N
DM108	DE-ICING COMPLETE	Notification that de-icing is completed.	N
DM125	REQUEST DEPARTURE CLEARANCE [departure clearance request]	Request for the specified departure clearance.	Y
DM126	DE-ICING STARTED	Notification that de-icing has started.	N
DM127	FOR DE-ICING	Indication that the associated request is issued in order to perform de-icing.	N
DM128	ABLE INTERSECTION [intersection] FOR DEPARTURE RUNWAY [runway]	Specifies the intersection for the specified departure runway in a taxi request.	N
DM129	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.	N
DM130	CANCELLING START-UP	Indication the aircraft is cancelling startup.	N
DM131	REQUEST PUSHBACK [pushback positionO]	Request to pushback. The pushback position	Y
DM132	REQUEST DE-ICING [ground locationO]	Request for de-icing at the current position or at the specified position.	Y
DM133	NO DE-ICING REQUIRED	Indication that de-icing is not required.	N
DM134	REQUEST START-UP	Request to startup.	Y
DM135	REQUEST TAXI [taxi requestO]	Request for taxi clearance. May specify to/from taxi position(s) and/or the ATIS code.	Y
DM136	REQUEST EXPECTED TAXI ROUTING [ground locationO]	Request for taxi routing information;	Y
DM137	WE CAN ACCEPT [clearance typeR] [assigned time]	Indication that the specified clearance type can be accepted at the time required to meet the specified time.	N
DM138	WE CANNOT ACCEPT [clearance typeR]	Indication that the specified clearance type cannot be accepted.	N
DM145 145	MESSAGE RECEIVED TOO LATE, RESEND MESSAGE OR CONTACT BY VOICE	Indication that the received message has a latency greater than the required latency	N

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1141 Appendix B : Operating Methods for D-TAXI request

1142 The following operating methods can be found in the project 06.07.02 Interim OSED Appendix A [22].

1143 **Note:** In the table below, a “U” (e.g., 5U) stands for UNABLE, a “C” (e.g., 5C) stands for
1144 CLEARANCE, an “R” (e.g., 9R) stands for ROGER, and a “W” (e.g., 9W) stands for WILCO.

1145 Table numbers are the ones of the OSED.

1146 Table 20: Pilot initiated D-TAXI Start-Up Request Operating Method

1147 Table 21: ATSU/Controller Initiated D-TAXI Start-Up Operating Method

1148 Table 22: Flight Crew initiated D-TAXI Push-Back approval Request Operating Method

1149 Table 23: Controller Initiated D-TAXI Push-Back Operating Method

1150 Table 24: Flight Crew Initiated D-TAXI Taxi-Out Request Operating Method

1151 Table 25: ATSU/controller Initiated D-TAXI Taxi-Out Operating Method

1152 Table 26: Flight Crew initiated D-TAXI Taxi-In Request Operating Method

1153 Table 27: ATSU/Controller Initiated D-TAXI Taxi-In Operating Method

1154 Table 28: ATSU/controller Initiated REVISED D-TAXI Request Operating Method

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