Network Manager

EUROCONTROL

DPI & API Implementation Road Map

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Approval Table

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2.400	01/10/2023	V. Cappellazzo /T. Kettunen/I. Suciu	Updates for REL 27.0 – SWIM Transition policy to NM B2B services

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1 Introduction

1.1 Identification

(1) This document forms part of the "ETFMS" documentation.

(2) This document has a document reference of "**Error! Bookmark not defined.**".

(3) This document has the Title of "DPI & API Implementation Road Map".

1.2 Purpose

(1) The purpose of this document is to describe the implementation Road Map for DPI and API messages.

(2) It describes the steps that need to be taken to validate the DPI and API messages before these can be taken into operations. The final step is taking the DPI/API into operations.

(3) It applies to Advanced Network Integrated (ANI) Airports (for AOP-NOP integration), CDM Airports and Advanced ATC TWR Airports. For ANI Airports and CDM Airports the full process is applicable and for Advanced ATC TWR only the relevant parts (i.e. the parts related to A-DPI and C-DPI messages).

(4) The NM and the Airport will have to plan, agree and execute the DPI and API Operational evaluations in accordance with the steps that are described in this document.

(5) This document also describes the DPI and API Validation Criteria. This is a set of measureable parameters that will determine if DPIs and/or APIs are ready to be put into operations.

(6) The implementation details can be found in the DPI Implementation Guide (Doc Ref 3), the API Implementation Guide (Doc Ref 6), the Flight Progress Messages document (Doc Ref 2) and the Advanced ATC TWR Implementation Guide (Doc Ref 4).

1.3 Scope

(1) The intended audience of this document is all staff at ANI Airports, CDM airports and ATC Staff at Advanced ATC TWR Airports, which are or will be involved in message exchange between the airport system(s) and NMOC/ETFMS. Staff with both a technical background and an operational background will be involved.

1.4 Colour coding

(1) The following colour coding is used in this document:

- Fuchsia background: Criteria to be reviewed during the first AOP-NOP trials, learning from experience
- Yellow background: not yet implemented, future extension

2 References

2.1 External

(1) This document makes reference to the following external documents, an external document being defined as a document not produced by the NM:

None

2.2 NM

(1) NM referenced documents **shall** take precedence over any referenced external documents wherever conflict arises between them. The following documents are referenced within this document:

Doc Ref 1: Airport CDM Implementation Manual – Edition 5.0, dated July 2017.

Doc Ref 2: Flight Progress messages document, ref APT/USD/MSG_INTF, version 2.900, author Hans Koolen, Ioana Coliban, dated 30/06/2023.

Doc Ref 3: DPI Implementation Guide, ref APT/USD/DPI_Impl_Guide, version 2.600, author Hans Koolen/Ioana Suciu, dated 30/06/2023.

Doc Ref 4: Advanced ATC TWR Implementation Guide, ref APT/USD/AdvAtcTwrImplGuide, version 1.900, author Hans Koolen, Ioana Suciu, dated 01/10/2023.

Doc Ref 5: NM B2B Web Services reference manuals of the applicable release – Essentials and sections linked to the concerned B2B Service

The NM B2B Web services reference manuals are published in the NM B2B OneSky Team shared space on the EUROCONTROL website which is accessible to the NM B2B Web Services users only.

However, access to the technical documentation can be requested to NM.customersupport@eurocontrol.int. The first info can also be found on “https://www.eurocontrol.int/service/network-manager-business-business-b2b-web-services”

Doc Ref 6: API Implementation Guide, ref APT/USD/API_Impl_Guide, version 1.300, author Hans Koolen & Richard Stevens, dated 30/06/2023.

3 Terminology

3.1 Concepts

(1) The following are the definitions of the main concepts that are particular to this Document and not of a more general nature:

None

3.2 Acronyms and Abbreviations

(1) The following are the definitions of the Acronyms and Abbreviations that are particular to this Document and not of a more general nature:

ANI - Advanced Network Integrated (airport)

ANSP - Air Navigation Service Provider
API - Arrival Planning Information (message)
ATFCM - Air Traffic Flow & Capacity Management
ATFM - Air Traffic Flow Management
CDM - Collaborative Decision Making
CFMU - Central Flow Management Unit
DPI - Departure Planning Information
EFD - ETFMS Flight Data (message)
ETFMS - Enhanced Tactical Flow Management System
FUM - Flight Update Message
ICD - Interface Control Document
IFPS - Initial Flight plan Processing System
OPS - Operational
NM - Network Manager
NMOC - Network Manager Operations Centre
QC - Quality Control

4 Summary

4.1 DPI Evaluations

(1) The DPI and API Operational Evaluations will be executed in several steps starting with a simple test of communications and ending with an evaluation of data that is provided from operational systems.

(2) The DPI and API Evaluation can be split into 6 major steps, including the last step, i.e. taking DPIs and APIs into operations:

1. Communication and Message Syntax verification (T1)
   This verification is performed by the NM Airport Unit Team. For DPI via AFTN, this step consists of testing if all the network communication links are in place and verification of the message syntax and global semantics.
   For DPI and API via B2B Web Services this step consists of testing the syntax and semantics of the B2B Web Services using a NM B2B PRE_OPS certificate, connected to the NM B2B_PREOPS platform.
   Before starting the test, the exchange of DPI and API with the validation platforms shall be authorised by the NM Airport Unit Team.
2. Evaluation of Live Data (T2)
   This evaluation is performed by the NM Airport Unit Team. This step consists of the evaluation of live data. It is performed by the transmission of DPI and API messages for Live/Operational traffic to the ETFMS Operational Evaluation system (OPEVAL) platform which contains copies of live data, i.e. it is a shadow system of the Operational System.
   For DPIs and APIs via B2B Web Services this step is performed using a NM B2B PRE_OPS certificate, connected to the OPEVAL platform.
   Before starting the test, the exchange of DPI and API with the validation platforms shall be authorised by the NM Airport Unit Team.
3. B2B Validation for release of OPS certificate (T3)

   This step applies only to evaluation of DPIs and APIs via B2B Web Services.

   This validation is performed by the NM B2B Team.

   It consists of analysing the Request / Reply patterns of the data once the T2 validation is complete. The validation is looking at consistency between the use cases and the user profile, the data volumes of the messages, the messages syntax and identification of overload events. This step is performed using a NM B2B PRE_OPS certificate, connected to the B2B_PREOPS Platform where the data is transmitted on a nominal manner for 10 days.

   When the validation is completed, the NM B2B issues an OPS certificate that will be used in the Operational Trial (T4) described below.
4. Operational Trial (T4)
   The purpose of this step is to verify the correct working of DPI and API message exchange between the Operational Airport system and the ETFMS Operational system.
5. Operations (T5)
   After all previous steps have been completed successfully the DPI and API messages can be put into operations on a permanent basis.
6. Post Operations Support (T6)
   It is important that Post Operations support is properly organised and guaranteed.

(3) Before T1 and T2 the

(4) A detailed overview of all the phases including estimated durations of the DPI and API Operational Evaluation can be found in Annex 1.

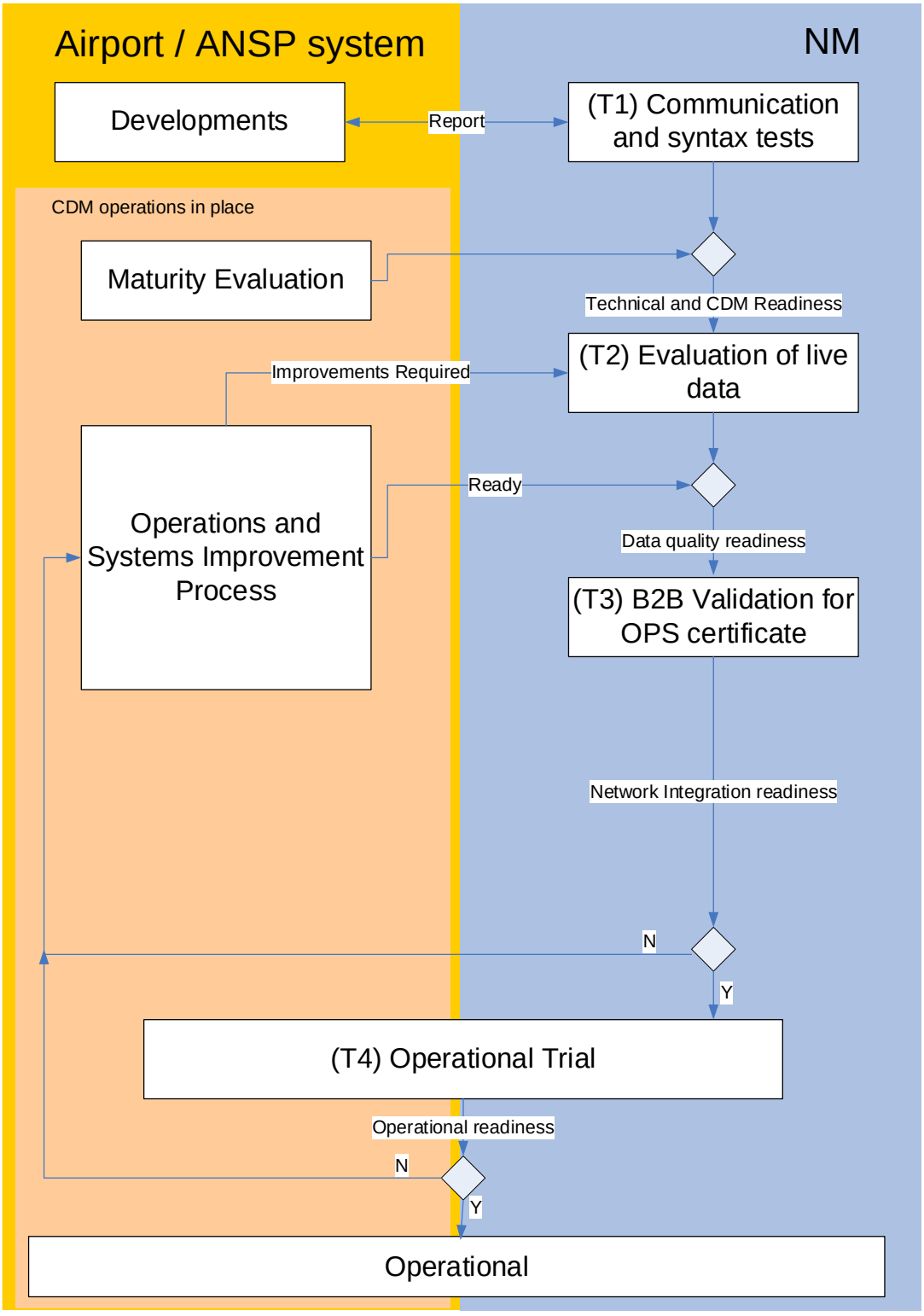

fig 1: DPI and API Evaluation schema

(5) Each step will take place during an agreed period, items to be tested will be agreed and an evaluation report will be provided.

4.2 DPI and API OPS Evaluation Criteria

(1) The DPI and API Validation Criteria is set of criteria that need to be fulfilled in order to put the DPI and API messages into Operations.

(2) The criteria have been split into 2 groups: “Quality Indicators” and “Performance Indicators”.

(3) The “Quality Indicators” show the completeness and the reliability of the DPI and API messages and the data in these messages.

(4) The “Performance Indicators” compare the DPI and API data with data of other sources such as flight plan data.

(5) The described quality indicators are applicable to normal circumstances and shall be achieved for 95% of the flights or DPI/API messages, unless otherwise specified.

4.3 NM Support during the OPS Evaluation Process

4.3.1 AFTN

(1) The implementation process for provision of DPI via AFTN is fully supported by the NM Airport Unit.

(2) Note that API messages cannot be provided via AFTN.

(3) For contact details, please refer to section 8 Contacts.

4.3.2 Transition to SWIM and NM B2B services implementation

(1) SWIM is one of the ATM functionalities identified by the ATM Master Plan and by the ICAO GANP for ATM modernisation. In Europe, the CP1 EU Implementing Regulation mandates the use of SWIM for the exchange of aeronautical, meteorological, network and flight information by the end of 2025.

(2) EUROCONTROL has developed SWIM specifications, which are means of compliance with CP1. The NM B2B Services have demonstrated conformance with the EUROCONTROL Specifications for SWIM and compliance with the CP1 regulation.

(3) In order to progress with the SWIM implementation at European level, NM has developed a policy for the transition to SWIM, describing guiding principles for the data exchanges with stakeholders and for the transitioning from current technologies. This Policy reflects the CP1 IR deployment scope and was approved by NDOP in 2018. Those principles led to the following approach:

a) CP1 IR mandates NM, ANSPs and (a set of) airports to implement the departure planning information exchange (DPI) and the flight update messages (FUM) via SWIM by **31/12/2025.**

b) After this deadline, NM will support the current messages for **two additional years**

c) The Target sunset date for DPI and FUM for all airports (in CP1 or not) and ANSPs is **31/12/2027.**

d) New NM services, required by CP1 (e.g. API messages) or other, will not be provided via old messaging technologies, only via NM B2B Services.

(4) The remaining part of the section describes the DPI and API implementation via NM B2B Services. The Migration of FUM to NM B2B services is described in the FUM Implementation Guide document. (nm.customersupport@eurocontrol.int)

(5) The implementation process for provision of DPI and API via B2B Web Services is supported by several units/services of NM.

(6) Airports have to request access to the B2B services and documentation by sending a request to: *NM.servicerequests@eurocontrol.int*.

(7) The NM B2B Web Services reference manuals are published in the Eurocontrol One-SKY teams B2B library. More information can also be found in Doc Ref 5.

(8) During the Registration Process, NM Services is the main point of contact and will direct any questions to the appropriate Technical and/or Business Specialists in NM. Please note that the registration process may take up to 2-3 months.

(9) During the Software Development and Testing phases, using the NM PREOPS certificate and system, questions can best be posted in the Discussion Forum on the B2B One-SKY teams. Please note that answers may already be available in previous discussions or amongst the answers to Frequently Asked Questions (FAQ).

(10) NM will do its best to respond within one day but it may take longer, especially for cases for which multiple specialists are required.

(11) For technical B2B support during operations, i.e. once the Operational Certificate is being used, the NM System Operators should be contacted on *nm.cso@eurocontrol.int* or on +32 2 745 19 97

(12) For questions related to DPI & API functional specifications, you may always contact your contacts at the NM Airports unit. For contact details, please refer to section 8 Contacts.

4.3.3 Certificates for NM B2B Services and associated testing platform

(1) Once the Registration process to the NM B2B services is completed, a PRE-OPS certificate will be delivered by NM B2B Team to the Organisation.

(2) With the PRE-OPS certificate the following platform can be accessed:

a) The PRE-OPS platform for the T1 testing with the NM Airport Team

b) The OPEVAL platform for the T2 testing with the NM Airport Team

c) The PRE-OPS platform for the T3 testing with the NM B2B Team

(3) Once the T3 testing phase is successfully completed, the NM B2B Team will deliver to the Organisation a OPS certificate with the same authorisations rights as the Pre-Ops certificate.

(4) With the OPS certificate the following platform can be accessed:

a) The OPS platform for the T4 (Live Trial) testing

b) The OPS platform for the T5 permanent exchange of the messages in operations.

(5) The details about each phase are described in the following Chapter 5.

5 DPI and API OPS Evaluation Phases

5.1 Communication and Message Syntax (T1)

5.1.1 Purpose

(1) The purpose of the "Communication and Message Syntax" test is to verify if the messages are addressed to the correct AFTN address or correct URL and if the connection is in place.

(2) An initial and quick verification of message syntax will save time during testing with live data.

5.1.2 How

5.1.2.1 For AFTN

(1) Step 1: Transmission of off-line copies of messages using E-mail for initial validation of syntax.

(2) Step 2: Transmission of several simple test messages via AFTN to the ETFMS test address, which is EUCHZMTT.

(3) The messages may contain test data. It is not necessary to provide data for live traffic for this test(s). It is important to have several examples of several different events and of each DPI type.

(4) Before starting the test, the exchange of DPI and API with the ETFMS test address shall be authorised by the NM Airport Unit Team.

5.1.2.2 For B2B Web Services

(1) This test consists of the provision of DPI and/or API messages to the NM B2B_PREOPS platform.

(2) The DPI and API messages must be provided via the appropriate URL https://www.b2b.preops.nm.eurocontrol.int/B2B_PREOPS/gateway/spec/27.0.0 .

(3) The NM B2B_PREOPS platform is used for B2B tests in general and allows for verifying of the correctness of the interface in both directions, i.e. the provision of DPI and/or API messages and the reception of replies to these messages.

(4) The messages may contain test data. It is not necessary to provide data for live traffic for this test(s). It is important to have several examples of several different events and of each DPI or API type.

(5) Before starting the test, the exchange of DPI and API with the NM B2B PRE-OPS platform shall be authorised by the NM Airport Unit Team.

5.1.3 How long

(1) One or several e-mails may be provided for AFTN tests.

(2) For B2B Web Services test, the test shall continue until all software problems have been solved.

(3) The connection test can be very short, one or two days should be planned.

5.1.4 Report

(1) The NM will provide comments to the provided off-line copies via e-mail.

(2) The results of the connection test will be provided via phone or e-mail.

(3) The ANI Airport, CDM Airport or the Advanced ATC TWR Airport is expected to implement improvements if necessary.

5.1.5 Next steps

(1) If the report identifies significant problems it will be necessary to find solutions and repeat the test. In all other cases the "Evaluation of Live Data" will be planned.

5.2 Evaluation of Live Data (T2)

5.2.1 Purpose

(1) The purpose of the Evaluation of Live Data is to determine the accuracy and consistency of the provided data and the suitability of the data for ATFCM purposes.

5.2.2 How

(1) The test consists of the transmission of DPI and/or API messages for Live/Operational traffic to the ETFMS (test) Ops Evaluation system. The ETFMS Ops Evaluation system is a non-operational ETFMS system but it receives a copy of the operational flight plans and regulations.

(2) The incoming messages will be processed, logged and analysed. ETFMS also provides additional log messages during the processing of the received messages.

(3) The analysis will be based upon the logged messages.

(4) During this phase it is recommended that the airport system uses FUM messages or ETFMS Flight data via B2B Web Services from the ETFMS Operational system.

5.2.2.1 For AFTN

(1) The DPI messages shall be transmitted via AFTN to the ETFMS test address which is EUCHZMTT.

5.2.2.2 For B2B Web Services

(1) The DPI and API messages must be provided via the appropriate URL: https://www.b2b.preops.nm.eurocontrol.int/B2B_OPEVAL/gateway/spec/27.0.0 .

(2) Before starting the test, the exchange of DPI and API with the OPEVAL platform shall be authorised by the NM Airport Unit Team.

5.2.3 How long

(1) During the first hour of the trial, addressing, format and common understanding by applications will be verified.

(2) This provision of data for one test session should be at least 24 hours without interruption. If possible several test sessions should take place during several days on several different days of a week.

(3) For planning purposes, 4 weeks must be reserved for one "Evaluation of Live Data". It includes, one week for execution, data analysis and report writing by the NM, one week for analysis of the report by the Airport and two weeks for possible adjustments of the software and procedures by the airport.

(4) In order to test the availability of systems and all the network connections involved, it is required to provide DPI and API messages for a period of at least 7-14 days continuously. In fact, the airport is recommended to provide the DPI messages from the first test onwards and continue transmission during the whole evaluation period without interrupting it.

(5) At a later stage, it could also be envisaged to repeat the trials during special circumstances such as strike, runway closure, de-icing,…

5.2.4 Report

(1) The received DPI and API messages and the generated ERRor messages and also the additional log messages generated by ETFMS will be analysed by NM with appropriate tools.

(2) The tools will generate statistics reports and other reports which will be used to investigate the history of flights (i.e. all the incoming and outgoing messages for a flight).

(3) The statistics report will be analysed by NM and airport specialists and a final evaluation report will be produced.

5.2.5 Next steps

(1) If the report identifies significant problems it will be necessary to find solutions and repeat the test. The solutions could consist of system adaptations or improving ANI, CDM or Advanced ATC TWR operations.

(2) From experience, we have learned that the “Evaluation of Live Data” has to be planned for at least 3 times, so approximately a total of 3 months in duration.

(3) This step may be concluded with a DPI and/or API Operational Evaluation Review meeting between NM and Airport Project Implementation team in order to summarize the outstanding issues, to conclude and to decide on the next steps.

(4) In all other cases the “ATFCM Impact Assessment” will be planned.

5.3 B2B Write Validation for release of OPS certificate (T3)

5.3.1 Purpose

(1) The purpose of the B2B Write Validation test is to determine the accuracy and consistency of the provided data and use cases with the NM B2B Access criteria for the release of an OPS certificate.

(2) This validation is performed by the NM B2B Team.

5.3.2 How

(1) Before this test, the Customer informs EUROCONTROL via the NM B2B Team, on the scope of service usage, the content and schedule of their tests to allow monitoring and interactions in case of wrong usage (volume of data or frequency of requests threshold as defined in [5]).

(2) The test consists of the transmission of DPI and/or API messages for Live/Operational traffic to the NM B2B_PREOPS platform on a nominal manner for 10 days.

(3) Testing consists of analysing the Request / Reply patterns of the data. The validation is looking at consistency between the use cases and the user profile, the data volumes of the messages, the messages syntax and identification of overload events.

5.3.2.1 For B2B Web Services

5.3.3 The DPI and API messages must be provided via the appropriate URL:

https://www.b2b.preops.nm.eurocontrol.int/B2B_PREOPS/gateway/spec/27.0.0

.How long

(1) The test consists of the transmission of DPI and/or API messages for Live/Operational traffic to the NM B2B_PREOPS platform on a nominal manner for at least 10 days.

(2) The NM B2B Team will then assess the data based on the exchange period.

5.3.4 Report

(1) The NM B2B Team will deliver to the organisation a technical assessment report and a summary of the assessment with the conclusions.

5.3.5 Next steps

(1) If the report identifies significant problems it will be necessary to find solutions and repeat the test. The solutions could consist of use cases adaptations, system adaptations, improving ANI, CDM or Advanced ATC TWR operations, informing the user community.

(2) In all other cases the OPS certificate will be delivered by the NM B2B Team and “Operational Trial” will be planned.

5.4 Operational Trial (T4)

5.4.1 Purpose

(1) The impact of DPI and API messages on ATFCM operations has been analysed in the "Evaluation of LIVE data" phase.

(2) However to verify the impact of the DPI and API messages on a complete Operational Environment, DPI and API Operational Trials will be organised.

(3) The purpose of the Operational Trials is to verify the correct working of the message exchange with the airport Operational system and its impact on the airport Operations.

(4) It is a final test before taking the DPI and API messages into operations on a permanent basis.

5.4.2 How

(1) The test consists of the transmission of DPI and/or API messages for Live/Operational traffic to the ETFMS Operational system.

(2) At least one TWR controller and one flow controller should be on duty for the whole duration of the trial.

(3) The incoming messages will be logged and analysed. ETFMS also provides log messages during the processing of the received messages.

(4) The analysis will be based upon the logged messages.

(5) During this phase it is required that the airport system uses FUM messages or ETFMS Flight data via B2B Web Services from the ETFMS Operational system.

(6) Before the start of the Operational Trial, the airport should publish a NOTAM.

(7) NM will publish an (internal) Operational Instruction (OI) as soon as the NOTAM is available.

5.4.2.1 For AFTN

(1) The DPI messages shall be transmitted via AFTN to the ETFMS OPS address which is EUCHZMTA.

5.4.2.1 For B2B Web Services

(1) The DPI and API messages must be provided via the appropriate URL: https://www.b2b.nm.eurocontrol.int/B2B_OPS/gateway/spec/27.0.0).

5.4.3 How long

(1) The DPI and API operational trials will be organised on 2 different days during a period of approximately 5 hours each day. The dates and times will be agreed with all concerned.

(2) For planning purposes one week should be reserved for this activity. It includes 2 days for the tests, 2 days for report writing and review by NM and 1 day for analysis of the report by the Airport Implementation Project Team.

5.4.4 Report

(1) The airport will have the opportunity to analyse the data exchange based upon its own tools.

(2) The received DPI and API messages and the generated ERRor messages and also the additional log messages generated by ETFMS will be analysed by appropriate tools.

(3) The ETFMS tools will generate statistics reports and other reports which will be used to investigate the history of flights (i.e. all the incoming and outgoing messages for a flight).

(4) The report will be interpreted by NM and airport specialists and a final evaluation report will be produced.

5.4.5 Next steps

(1) If the report identifies significant problems it will be necessary to find solutions and repeat the test. The solutions could consist of system adaptations, improving ANI, CDM or Advanced ATC TWR operations, informing the user community.

(2) In all other cases the “Operations” will be planned

5.5 Operations (T5)

5.5.1 Purpose

(1) After all previous steps have been successfully completed, the DPI and API messages can be put into operations on a permanent basis.

5.5.2 How

(1) Before the DPI and API messages can be sent to the ETFMS Operational System, the airport must ensure that the following Action List is completed:

Action Nr	Description
APT.1	Agree the date with NM to go Operational
APT.2	Review the TIS value. A shorter TIS value may be better now that pre-departure sequence is used (A-CDM airport).
APT.3	Provide Functional Contact Details These contact details will be included in the DPI-ICD and API-ICD.
APT.4	Provide TWR Contact Details These contact details will be included in the DPI-ICD and API-ICD.
APT.5	Provide System Monitoring contact details These contact details will be included in the DPI-ICD and API-ICD
APT.6	Ensure that the System Technical Supervisors know the procedure to interrupt DPIs and APIs in case of unexpected problems, and know about other possible requests from NMOC related to the DPIs/APIs
APT.7	Draft NOTAM and review the ATFM part with NM
APT.8	Draft AIP/AIC update and review the ATFM part with NM
APT.9	Ensure B2B certificate with Ops access (including access to the DPI/API services) has been requested and approved
APT.10	Publish AIP/AIC before start of operations (or as soon as possible)
APT.11	Change AFTN address from EUCHZMTT to EUCHZMTA on agreed date and time or change URL and the B2B certificate from the B2B_OPEVAL platform to the B2B_OPS platform.
APT.12	Ensure close operational monitoring during the first two weeks of operations
APT.13	Ensure sufficient post-operational support also after the first weeks of operations
APT.14	Provide contacts for ADCH UG and AICH WG
APT.15	Ensure Tower is aware in advance of new DPI/API operations and procedures

(2) During the first hours of operations the DPI and API message exchange shall be carefully monitored both by NM Operations (NMOC) Staff and Airport operations staff (i.e. TWR, Airport Operations Centre, AOs, handlers,…).

5.5.3 How long

(1) If DPI and API messages had not been provided on a continuous basis before, the Operational Reliability and stability has to be proven by transmission of continuous operational DPI and API messages for 2 weeks. This will also ensure that the impact of the “learning curve” at the airport for the network is reduced to the absolute minimum.

(2) For preparations of the Operations, approximately 4 weeks must be reserved. This consists first of preparations for a GoNoGo meeting, and afterwards, of preparations of the operations.

(3) Operations start at the agreed date and time and will continue until further notice.

5.5.4 Report

(1) Any special case shall be reported to NM and ANI, CDM, or Advanced ATC TWR Airport specialist for further investigation.

5.5.5 Next steps

(1) Ensure Post Operations Support.

5.6 Post Operations Support (T6)

5.6.1 Purpose

(1) It is essential to guarantee Post Operations Support after DPIs and APIs of a new Airport have been taken into operations.

(2) During the first weeks of operations of DPI and API messages, all types of users such as Aircraft Operators, ATC TWR controllers, Ground Handlers, Flow managers,…. may have questions. A quick analysis of the reported cases will ensure that the new users will get more confidence in the DPI and API messages.

(3) It may also happen that during first operations some unidentified software problems appear and these need to be analysed asap.

5.6.2 How

(1) Ensure that during the first 2-4 weeks after the first day of operations, DPI and API specialists and ANI Airport, Airport CDM or Advanced ATC TWR system experts are available to answer to queries for the Airport Users and from NM on very short notice, preferably within 24 hrs.

(2) After this 2-4 weeks period it is important that such a Function remains available but the response time may be longer. The recommendation is to respond within 5 working days to User's and NM's requests.

(3) Post Operations Support is normally only available during Office Hours.

5.6.3 How long

(1) During the first 2-4 weeks after first operations, a short response time is required.

(2) After this period Post Operations Support shall remain available as in all other operational cases, and the response time may be longer than during the initial period.

5.6.4 Reporting

(1) Any special case shall be reported to NM and ANI, CDM or Advanced ATC TWR Airport specialist for further investigation.

5.6.5 Next steps

(1) No more next steps.

6 DPI OPS Evaluation Criteria

6.1 Introduction

(1) The purpose of this section is to list criteria for validation and acceptance of the DPI messages.

(2) This set of criteria needs to be fulfilled during the DPI Operational Evaluation in order to put the DPI messages into Operations.

(3) The criteria have been split into 5 groups:

1. Sanity Checks
2. Quality of Data
3. Predictability
4. ATFCM Behaviour
5. Operational Readiness

(4) The "Sanity Checks" Indicators show the percentages of DPI messages that were considered to be erroneous, missing,…

(5) The "Quality of Data" Indicators evaluate the number of updates received via DPI messages and evaluate data fields such as the taxi-time.

(6) The "Predictability" Indicators compare the DPI data with data of other sources such as flight plan data in terms of accuracy and the time when the updates have been received.

(7) The "ATFCM Behaviour" Indicators compare the DPI data with expected ATFCM Operational behaviour such as Adherence to ATFM Slots, suspensions by Flight Activation Monitoring (FAM),…

(8) The "Operational Readiness" Indicators show if the ANI Operations, CDM Operations or Advanced ATC TWR Operations and the corresponding DPI messages are sufficiently mature to be put into operations at NMOC.

(9) The Indicators that are shown with a yellow background are also part of the CDM Completeness Criteria (see Doc Ref 1) that are applicable to CDM Airport implementation projects (only).

6.2 Sanity Checks

6.2.1 General

(1) The below mentioned quality indicators are applicable to normal circumstances and shall be achieved for 95% of the flights or DPI messages.

6.2.2 DPI Syntax Error Indicator

(1) The purpose of these statistics is to show the percentage of DPI messages that contain a syntax error.

Ref	Indicator Name	Target Value	Acceptable Range	Example
1.1	DPI_with_Syntax_Error	0 %	0%	0%

6.2.3 UnCorrelated DPI Messages Indicators

(1) The purpose of these statistics is to show the percentage of DPI messages which could not be correlated to flight data by ETFMS.

Ref	Indicator Name	Target Value	Acceptable Range	Example
2.0	P-DPI_UnCorrelated	0%	<0.1%	0.0%
2.1	E-DPI_UnCorrelated	0%	<0.1%	0.0%
2.2	T-DPI-t_UnCorrelated	0%	<0.1%	0.1%
2.3	T-DPI-s_UnCorrelated	0%	<0.1%	0.0%
2.4	A-DPI_UnCorrelated	0%	<0.1%	0.1%
2.5	C-DPI_UnCorrelated	0%	<0.1%	0.0%

6.2.4 Rejected & Ignored DPI messages Indicators

(1) The purpose of these statistics is to show the number of DPI messages which could not be processed by ETFMS.

(2) ETFMS validates the DPI messages and if a message does not comply with the validation criteria, ETFMS will send a reply message to the originator.

(3) This is the percentage of DPI messages that could not be processed by ETFMS. Examples are:
- DPI message received too early or too late
- DPI message not in correct sequence
- Provided take-off time out of bounds

(4) The following table shows the total percentage of DPI message which could not be processed:

Ref	Indicator Name	Target Value	Acceptable Range	Example
3.1	DPI RejectedIgnored	0%	<=1%	0.9%

6.2.5 DPI messages Not Fully Processed Indicators

(1) The purpose of these statistics is to show the percentage of DPI messages that were not fully processed by ETFMS. Examples of such message are:
- Unknown SID
- Unknown Aircraft Type
- …

(2) The table below shows the percentage of not-fully processed DPI messages per DPI-type:

Ref	Indicator Name	Target Value	Acceptable Range	Example
4.0	P-DPI_Not_Fully_Processed	0 %	<= 1%	1%
4.1	E-DPI_Not_Fully_Processed	0 %	<= 1%	1%
4.2	T-DPI-t_Not_Fully_Processed	0 %	<= 1%	1%
4.3	T-DPI-s_Not_Fully_Processed	0 %	<= 1%	1%
4.4	A-DPI_Not_Fully_Processed	0 %	<= 1%	1%

6.2.6 DPI Completeness Indicators

(1) The purpose of these statistics is to show the number of received DPI messages compared to the number of departures from the airport concerned.

(2) The table shows the percentage of flights for which at least one P-DPI, E-DPI, T-DPI-t, T-DPI-s and A-DPI has been received. It also shows the percentage of flights for which a C-DPI has been received and the percentage of flights for which no DPI at all was received.

Ref	Indicator Name	Target Value	Acceptable Range	Example
5.0	P-DPI_Completeness	100%	>=98.0%	100%
5.1	E-DPI_Completeness	100%	>=99.5%	100%
5.2	T-DPI-t_Completeness	100%	>=99.5%	99.5%
5.3	T-DPI-s_Completeness	100%	>=99.5%	100%
5.4	A-DPI_Completeness	100%	>=99.5%	99.5%
5.5	C-DPI_Completeness	0%	<=2%	4%
5.6	Flights_without_DPIs	0%	<0.5%	0.2%
5.7	Long-term Completeness 3)	100%	>=98%	100%

Notes:

1) The yellow colour shows that it is also part of the CDM Completeness Criteria (see Doc Ref 1).
2) The P-DPI completeness is expected to be lower because of CNL and Refile after EOBT – 3h should not contain P-DPI messages.
3) The long-term completeness is determined by calculating the completeness values over an uninterrupted 7-day period.

6.3 Quality of Data

6.3.1 DPI Update Rate Indicators

(1) The purpose of these statistics is to show flights for which many DPI message updates of the same type have been sent. Further investigations may be required to identify if this is normal behaviour (for the evaluated day) or if there is an area for improvement for the airport.

Ref	Indicator Name	Target Value	Acceptable Range	Example
6.21	P-DPI_UpdateRate_1	100%	70% - 100%	99%
6.22	P-DPI_UpdateRate_2	0%	<=30%	1%
6.23	P-DPI_UpdateRate_3	0%	<=20%	0%
6.24	P-DPI_UpdateRate_3+	0%	<=10%	0%
6.1	E-DPI_UpdateRate_1	100%	89% - 100%	99%

6.2	E-DPI_UpdateRate_2	0%	<=10%	1%
6.3	E-DPI_UpdateRate_3	0%	<=1%	0%
6.4	E-DPI_UpdateRate_3+	0%	<=1%	0%
6.5	T-DPI-t_UpdateRate_1	100%	65% - 100%	89%
6.6	T-DPI-t_UpdateRate_2	0%	<=35%	10%
6.7	T-DPI-t_UpdateRate_3	0%	<=20%	1%
6.8	T-DPI-t_UpdateRate_3+	0%	<=5%	1%
6.9	T-DPI-s_UpdateRate_1	100%	40% - 100%	89%
6.10	T-DPI-s_UpdateRate_2	0%	<=40%	10%
6.11	T-DPI-s_UpdateRate_3	0%	<=30%	1%
6.12	T-DPI-s_UpdateRate_3+	0%	<=10%	1%
6.13	A-DPI_UpdateRate_1	100%	89% - 100%	90%
6.14	A-DPI_UpdateRate_2	0%	<=15%	9%
6.15	A-DPI_UpdateRate_3	0%	<=1%	1%
6.16	A-DPI_UpdateRate_3+	0%	<=0.5%	1%
6.17	C-DPI_UpdateRate_1	0%	<=3%	2%
6.18	C-DPI_UpdateRate_2	0%	<=1%	2%
6.19	C-DPI_UpdateRate_3	0%	<=0.5%	0%
6.20	C-DPI_UpdateRate_3+	0%	<=0.5%	0%

6.3.2 IFPS Inconsistency Indicators

(1) The purpose of these statistics is to show the number of Aircraft Type, Registration and EOBT inconsistencies that have been derived from DPI messages.

(2) Assuming that the Airport has better information about ARCTYP and REG than can be derived from FPL data, any positive value can be considered as a benefit of DPI messages.

Ref	Indicator Name	Target Value	Acceptable Range	Example
7.1	DPI_ARCTYP_Inconsistency	No target	Any value is an improvement	0%
7.2	DPI_REG_Inconsistency	No target	Any value is an improvement	5%
7.3	DPI_EOBT_Inconsistency	No target	Any value is an improvement	2%

6.3.3 Taxi-time evaluation

(1) The purpose of these statistics is to evaluate the provided taxi-times.

(2) It compares the provided taxi-times with the average taxi-time as specified in the NM/CACD system.

(3) It identifies minimum and maximum taxi-times for a possible verification.

(4) Note that there are no specific quality criteria for taxi-times.

6.4 Predictability

6.4.1 Filing Time Behaviour Indicators

(1) These indicators show the filing-time of the DPI messages compared to the:

- TTOT in the message
  The purpose of these statistics is to show average prediction time of the DPI messages. The prediction time is the time that the provided TTOT is in the future. For example: Is the TTOT from the DPIs 20 minutes in the future or 2 hours in the future?
- Flight plan derived ETOT (EOBT+taxitime) or the CTOT
  The purpose of these statistics is to show average prediction time of the provided TTOTs compared to the flight data in ETFMS. For example: do DPIs provide an estimate at 20 minutes before the ETOT/CTOT or at 2 hours before the ETOT/CTOT?
- ATOT (from FSA messages)
  The purpose of these statistics is to show the average prediction time of the provided TTOTs compared to the Actual Take-Off Time (ATOT) derived from the FSA message.

Ref	Indicator Name	Min [Min]	Max [min]	Average [min]		
				Target Value	Accep-table Range	Ex.
9.0	P-DPI_AvgFilTime_Before_TOT 1)			None yet	180 –1200+VTT	600
9.1	E-DPI AvgFilTime Before TOT 1)			180+VTT	100 – 180+VTT	172
9.2	T-DPI-t AvgFilTime Before TOT 1)			120+VTT	60 – 120+VTT	103
9.3	T-DPI-s AvgFilTime Before TOT 1)			40+VTT	25 – 40+VTT	32
9.4	A-DPI AvgFilTime Before TTOT			Avg VTT	5 – 30	13

Notes:

1) "_TOT": it is TTOT if present, else it is turnaroundTTOT

Ref	Indicator Name	Min [Min]	Max [min]	Average [min]		
				Target Value	Accep-table Range	Ex.
10.0	P-DPI AvgFilTime Before ETOTCTOT			None yet	180 –1200+VTT	600
10.1	E-DPI AvgFilTime Before ETOTCTOT			180+VTT	100 – 180+VTT	184
10.2	T-DPI-t AvgFilTime Before ETOTCTOT			120+VTT	60 – 120+VTT	95
10.3	T-DPI-s AvgFilTime Before ETOTCTOT			40+VTT	25 – 40+VTT	39
10.4	A-DPI AvgFilTime Before ETOTCTOT			Avg VTT	5 – 30	19

Ref	Indicator Name	Min [Min]	Max [min]	Average [min]		
				Target Value	Acceptable Range	Ex.
11.0	P-DPI AvgFilTime Before ATOT			None yet	180 –1200+VTT	600

11.1	E-DPI AvgFilTime Before ATOT			180+VTT	100 – 180+VTT	189
11.2	T-DPI-t AvgFilTime Before ATOT			120+VTT	60 – 120+VTT	98
11.3	T-DPI-s AvgFilTime Before ATOT			40+VTT	25 – 40+VTT	32
11.4	A-DPI AvgFilTime Before ATOT			Avg VTT	5 – 30	15

(2) Note that the Indicators 11.0 – 11.4 are based upon non-regulated flights only.

6.4.2 Take-Off-Time (TOT) Predictability Accuracy Indicators - 1

(1) The Take-Off-Time (TOT) Predictability is determined by calculating the absolute average differences between the ATOT and the TOTs from different messages.

(2) The comparison between the different message types shall be done by comparing the Performance Indicators of each message type.

(3) The ATOT is derived from FSA messages.

(4) Each indicator is calculated as follows:

FPL_Avg_Abs_ETOT_to_ATOT: avg(abs(ATOT–(EOBT+StandardTaxiTime)))
T-DPI-t_Avg_Abs_TTOT_to_ATOT: avg(abs(ATOT – TTOT))
T-DPI-s_Avg_Abs_TTOT_to_ATOT: avg(abs(ATOT – TTOT))
A-DPI_Avg_Abs_TTOT_to_ATOT: avg(abs(ATOT – TTOT))

Ref	Indicator Name 1)	Target Value [min]	Acceptable Range [min]	Example
11.10	FPL_Avg_Abs_ETOT_to_ATOT 2)	0	<= 15	
11.11	P-DPI_Avg_Abs_TOT_to_ATOT 4)	0	<= 13	
11.12	E-DPI_Avg_Abs_TOT_to_ATOT 4)	0	<= 13	
11.13	T-DPI-t_Avg_Abs_TOT_to_ATOT 4)	0	<= 12	
11.14	T-DPI-s_Avg_Abs_TOT_to_ATOT 4)	0	<= 10	
11.15	A-DPI_Avg_Abs_TTOT_to_ATOT	0	<= 5	

Notes:
1) These statistics are based upon the last received message of that type.
2) "FPL" includes FPL+DLA+CHG messages
3) The yellow colour shows that it is also part of the CDM Completeness Criteria (see Doc Ref 1).
4) "_TOT": it is TTOT if present, else turnaroundTTOT

6.4.3 Take-Off-Time (TOT) Predictability Accuracy Indicators - 2

(1) A second method of determining the Take-Off-Time (TOT) Predictability is by determining the percentage of messages that are within a pre-defined range.

(2) It starts with calculating the absolute average differences between the ATOT and the TOTs from different messages. Then the percentage of messages that are within a certain accuracy, for example 10 min is calculated.

(3) The Comparison between the different message types shall be done by comparing the Performance Indicator of each message type.

(4) The ATOT is derived from FSA messages.

Ref	Indicator Name 1)	Target Value	Acceptable Range	Example
11.20	FPL_Predictability_10min_Acc 2)	100%	No range	69%
11.21	P-DPI_Predictability_10min_Acc (tTTOT)	100%	>= FPL percentage	73%
11.22	P-DPI_Predictability_10min_Acc (eTTOT)	100%	>= FPL percentage	73%
11.23	E-DPI_Predictability_10min_Acc (tTTOT)	100%	>= FPL percentage	73%
11.24	E-DPI_Predictability_10min_Acc (eTTOT)	100%	>= FPL percentage	73%
11.25	T-DPI-t_Predictability_10min_Acc (tTTOT)	100%	5% better than FPL	78%
11.26	T-DPI-t_Predictability_10min_Acc (eTTOT)	100%	5% better than FPL	78%
11.27	T-DPI-s_Predictability_10min_Acc (tTTOT)	100%	10% better than FPL	83%
11.28	T-DPI-s_Predictability_10min_Acc (eTTOT)	100%	10% better than FPL	83%
11.29	A-DPI_Predictability_10min_Acc	100%	>=95%	98%

Notes:
1) These statistics are based upon the last received message of that type. In order to be able to compare data, these indicators are produced on non-regulated flights only.
2) "FPL" includes FPL+DLA+CHG messages.

6.5 ATFCM Behaviour

6.5.1 Adherence to ATFM Slot Tolerance Window Indicators

(1) The purpose of these statistics is to compare the DPI Target Take-Off Time (TTOT) with the CTOT in order to determine if the ANI, CDM or Advanced ATC TWR Airport is usually providing a TTOT before the STW, inside the STW or after the STW.

(2) These indicators show the percentage of A-DPI messages for regulated flights that have a TTOT inside the Slot Tolerance Window (default value: -5 - +10).around the CTOT.

Ref	Indicator Name	Target Value	Acceptable Range	Example
13.1	A-DPI_Inside_STW	100 %	>= 90%	89%

(3) Overall figures of the OPERATIONAL Adherence to ATFM Slots (based upon the ATOT from FSA messages) must be better than 80%.

Ref	Indicator Name	Target Value	Acceptable Range	Example
13.2	FSA_ATOT_Inside_STW	100 %	>= 80%	89%

6.5.2 Adherence to Departure Tolerance Window Indicators

(1) The purpose of these statistics is to compare the DPI Target Take-Off Time (TTOT) of non-regulated flights with the last received OBT+Taxi-Time in order to determine if the ANI, CDM or Advanced ATC TWR Airport is usually providing a TTOT in accordance with the Departure Tolerance Window (DTW).

(2) These indicators show the percentage of A-DPI messages for non-regulated flights that have an TTOT inside the Departure Tolerance Window (default value: -15 - +15) around the last received OBT+DPI_TaxiTime.

Ref	Indicator Name	Target Value	Acceptable Range	Example
14.1	A-DPI Inside DTW	100 %	>= 80%	72%

6.5.3 CDM Flights suspended by FAM

(1) The purpose of this report is to identify flights for which the A-CDM procedures were not followed.

(2) Flights for which DPI message are received from CDM airports are normally very well planned and sequenced. The CDM procedures shall ensure that in case the HA and/or pilot do not accurately update the TOBT and/or adhere to the TSAT, the Network is informed via a C-DPI (before the flight is suspended by FAM). Therefore it is not normal that flights at CDM Airports end up suspended by FAM.

Ref	Indicator Name	Target Value	Acceptable Range	Example
15.1	FAM suspended fights	0	<=3	xxx

6.5.4 SIDs in DPI messages

(1) The purpose of this report is to identify if the provision of SIDs in terms of completeness and acceptance rate by NM/ETFMS is in accordance with expectations.

Ref	Indicator Name	Target Value	Acceptable Range	Example
18.1	T-DPI-s SID completeness	100%	>= 90%	99%
18.2	A-DPI SID completeness	100%	>= 99%	100%

Ref	Indicator Name	Target Value	Acceptable Range	Example
18.3	T-DPI-s SID not selected/rejected	0%	<= 20%	5%
18.4	A-DPI SID not selected/rejected	0%	<= 20%	2%

6.5.5 TOBT and TSAT quality

(1) The TOBT and TSAT values are disseminated via CHMI, the NOP Portal and B2B Web Services, in order to increase the situational awareness of stakeholders of the departures.

(2) In addition, the EOBT update service for airlines is based on the TOBT value.

(3) TOBT and TSAT values of a sufficient quality are therefore desirable.

(4) The indicators used, measure the presence rate as well as the acceptance rate of the TOBT and TSAT values in the different DPI messages (in percentages):

Ref	Indicator Name	Target Value	Acceptable Range	Example
22.1	E-DPI TOBT Present (%)	No target	-	5%
22.2	T-DPI-t TOBT Present (%)	No target	-	80%
22.3	T-DPI-s TOBT Present (%)	100%	>95%	100%
22.4	T-DPI-t TSAT Present (%) (for T-DPI-t received after TOBT-20min)	100%	>95%	100%
22.5	T-DPI-s TSAT Present (%)	100%	>=99%	100%
22.6	E-DPI TOBT Rejected	0.0%	<=3%	1%
22.7	T-DPI-t TOBT Rejected	0.0%	<=3%	1%
22.8	T-DPI-s TOBT Rejected	0.0%	<=3%	1%
22.9	T-DPI-t TSAT Rejected	0.0%	<=3%	1%
22.10	T-DPI-s TSAT Rejected	0.0%	<=3%	1%
22.11	E-DPI TOBT questionable	0.0%	<=3%	1%
22.12	T-DPI-t TOBT questionable	0.0%	<=3%	1%
22.13	T-DPI-s TSAT questionable (non-regulated)	0.0%	<=3%	1%
22.14	T-DPI-s TSAT questionable (regulated)	0.0%	<=3%	1%

6.5.6 Instable TTOT values

(1) The purpose of this report is to investigate & report number of Jumping xTOT values within the DPI messages.

(2) Jumping xTTOT values cause instability of Network traffic predictions for the Flow Controllers and the FMPs and shall occur only occasionally.

(3) A jumping xTOT is defined in two ways:

a) xTOT of a DPI which is after the preceding xTOT of a DPI and after the xTOT of the next DPI of ATOT of the FSA with a tolerance of 10 minutes (total of 20min)

b) xTOT of a DPI which is before the preceding xTOT of a DPI and before the following xTOT of a DPI or the ATOT of the FSA with a tolerance of 10 minutes (total of 20min)

Ref	Indicator Name	Target Value	Acceptable Range	Example
25.1	Jumping P-DPI tTTOT	0%	<= 5%	3%
25.2	Jumping P-DPI eTTOT	0%	<= 5%	3%
25.3	Jumping E-DPI tTTOT (or TTOT)	0%	<= 5%	3%
25.4	Jumping E-DPI eTTOT	0%	<= 5%	3%
25.5	Jumping T-DPI-t tTTOT (or TTOT)	0%	<= 5%	3%
25.6	Jumping T-DPI-t eTTOT	0%	<= 5%	3%
25.7	Jumping T-DPI-s tTTOT	0%	<= 5%	3%
25.8	Jumping T-DPI-s eTTOT (or TTOT)	0%	<= 5%	3%
25.9	Jumping A-DPI	0%	<= 5%	3%

6.6 Operational Readiness

6.6.1 Long duration test

(1) In order for an airport to be ready to be integrated operationally with the ATM network, it is required that local ANI, CDM or Advanced ATC TWR operations are sufficiently mature.

(2) It is essential to have done sufficient testing with operational data with the NMOC in order to detect most special cases (e.g. night and weekend operations) and identify solutions.

(3) It is essential that most operations staff, including handling staff, pilots, TWR,… have become used to the newly introduced ANI, CDM or Advanced ATC TWR working methods and tools. The impact on the network of staff learning new working practices and inevitable making mistakes should be reduced to the absolute minimum.

(4) For these reasons, it is required that a ANI, CDM or Advanced ATC TWR airport provides DPI data for live traffic during an uninterrupted period of at least 7-14 days to the ETFMS test system before the DPIs are sent to the ETFMS Operational system.

Ref	Indicator Name	Target Value	Acceptable value	Example
5.7	Long duration test	1 month	7 days	21 days

7 API OPS Evaluation Criteria

7.1 Introduction

(1) The purpose of this section is to list criteria for validation and acceptance of the API messages.

(2) This set of criteria needs to be fulfilled during the second phase of the API Operational Evaluation (i.e. Evaluation of Live Data) in order to put the API messages into Operations.

(3) The criteria have been split into 5 groups:

1. Sanity Checks
2. Quality of Data
3. Predictability
4. ATFCM Behaviour
5. Operational Readiness

(4) The “Sanity Checks” Indicators show the percentages of API messages that were considered to be erroneous, missing,…

(5) The “Quality of Data” Indicators evaluate the number of updates received via API messages and evaluate the data attributes such as the taxi-time.

(6) The “Predictability” Indicators compare the API data with data of other sources such as flight plan data in terms of accuracy and the time when the updates have been received.

(7) The “ATFCM Behaviour” Indicators compare the API data with expected ATFCM Operational behaviour such as availability and accuracy of Estimated Landing times, availability of Terminal information, accuracy and availability of STAR data,…

(8) The “Operational Readiness” Indicators show if the Airport/ANSP operations for AOP-NOP Integration or extended AMAN Operations and the corresponding API messages are sufficiently mature to be put into operations at NMOC.

7.2 Sanity Checks

7.2.1 General

(1) The below mentioned quality indicators are applicable to normal circumstances and shall be achieved for 95% of the flights or General API messages.

7.2.2 API Syntax Error Indicator

(1) The purpose of these statistics is to show the percentage of API messages that contain a syntax error detected by the CUA (Not passed to ETFMS).

Ref	Indicator Name	Target Value	Acceptable Range	Example
123.0	API with Syntax Error	0 %	0%	0%

7.2.3 UnCorrelated API Messages Indicators

(1) The purpose of these statistics is to show the percentage of API messages which could not be correlated to flight data available in ETFMS.

Ref	Indicator Name	Target Value	Acceptable Range	Example
102.0	G_API_UnCorrelated	0%	<0.1%	0.0%
102.1	TTA_API_UnCorrelated	0%	<0.1%	0.0%
102.2	TTO_API_UnCorrelated	0%	<0.1%	0.1%

7.2.4 Rejected & Ignored API messages Indicators

(1) The purpose of these statistics is to show the number of API messages which could not be processed by ETFMS.

(2) ETFMS validates the API messages and if a message does not comply with the validation criteria, ETFMS will send a reply message to the originator.

(3) This is the percentage of API messages that could not be processed by ETFMS. Examples are:
- API message sent for a suspended flight
- API message received too early or too late
- API message not in correct sequence
- Provided landing time out of bounds

(4) The following table shows the total percentage of API message which could not be processed:

Ref	Indicator Name	Target Value	Acceptable Range	Example
103.0	API_ RejectedIgnored	0%	<=1%	0.9%

7.2.5 API messages Not Fully Processed Indicators

(1) The purpose of these statistics is to show the percentage of API messages that were not fully processed by ETFMS. Examples of such message are:
- Unknown STAR
- Unknown Aircraft Type
- …

(2) The table below shows the percentage of not-fully processed API messages per API-type:

Ref	Indicator Name	Target Value	Acceptable Range	Example
104.0	G_API_Not_Fully_Processed	0 %	<= 1%	1%
104.1	TTA_API_Not_Fully_Processed	0 %	<= 1%	1%
104.2	TTO_API_Not_Fully_Processed	0 %	<= 1%	1%

7.2.6 API Completeness Indicators

(1) The purpose of these statistics is to show the number of received API messages compared to the number of arrivals to the airport, set of airports or TMA concerned.

(2) The table shows the percentage of flights for which at least one General-API (G-API), TargetTakeOff-API (TTA-API) and TargetTimeOver-API (TTO-API) has been received.

(3) It also shows the percentage of flights for which TTA-API and TTO-API have been received and the TargetAPIUseCase is set to "Remove" –Remark: this is functionally equivalent to a cancel of previously received arrival information.

(4) Percentage of flights for which no API at all was received.

Ref	Indicator Name	Target Value	Acceptable Range	Example
105.1	G_API_Completeness	100%	>=99.5%	100%
105.2	TTA_API_Completeness 1)	4)	None 4)	14%
105.3	TTO_API_Completeness 1)	4)	None 4)	99.5%
105.5	TTA_API TargetAPIUseCase is set to "Remove"	0%	<=2%	1%
105.6	TTO_API TargetAPIUseCase is set to "Remove"	0%	<=2%	1%
105.7	Flights_without_G_APIs	0%	<0.5%	0.2%
105.7	Completeness duration 3)	100%	<=98%	100%

Notes:

1) The regulated flights to be considered for this analysis are those with the Most Penalising Regulation created by the airport or traffic volume for which the arrival sequence is managed.
2) The yellow colour shows that it is also part of the AOP-NOP Completeness Criteria (see Doc Ref 1).
3) The completeness duration is determined by calculating the completeness values over an uninterrupted 7-day period.
4) As agreed in the API-ICD.

7.3 Quality of Data

7.3.1 API Update Rate Indicators

(1) The purpose of these statistics is to show flights for which many API message updates of the same type have been sent. Further investigations may be required to identify if this is normal behaviour (for the evaluated day) or if there is an area for improvement for the airport or ANSP system.

Ref	Indicator Name	Target Value	Acceptable Range	Example
106.0	G_API_UpdateRate_0	0%	<=10%	0%
106.1	G_API_UpdateRate_1	100%	70% -100%	99%
106.2	G_API_UpdateRate_2	0%	<=20%	0%
106.3	G_API_UpdateRate_3	0%	<=10%	0%
106.4	G_API_UpdateRate_4-6	0%	<=10%	0%
106.5	G_API_UpdateRate_7-9	0%	<=10%	0%
106.6	G_API_UpdateRate_10+	0%	<=10%	0%

106.7	TTA_API_UpdateRate_0	0%	<=10%	0%
106.8	TTA_API_UpdateRate_1	100% of regulated flights	70% -100%	99%
106.9	TTA_API_UpdateRate_2	0%	<=20%	0%
106.10	TTA_API_UpdateRate_3	0%	<=10%	0%
106.11	TTA_API_UpdateRate_4-6	0%	<=1%	0%
106.12	TTA_API_UpdateRate_7-9	0%	<=1%	0%
106.13	TTA_API_UpdateRate_10+	0%	<=1%	0%
106.14	TTO_API_UpdateRate_0	0%	<=10%	0%
106.15	TTO_API_UpdateRate_1	100% of regulated flights	95% -100%	99%
106.16	TTO_API_UpdateRate_2	0%	<=2%	0%
106.17	TTO_API_UpdateRate_3	0%	<=1%	0%
106.18	TTO_API_UpdateRate_4-6	0%	<=1%	0%
106.19	TTO_API_UpdateRate_7-9	0%	<=1%	0%
106.20	TTO_API_UpdateRate_10+	0%	<=0%	0%

7.3.2 IFPS Inconsistency Indicators

(1) The purpose of these statistics is to show the number of Aircraft Type and Registration inconsistencies that have been derived from General API messages.

(2) The report allows to evaluate the usefulness of receiving ARCTYP and REGistration via G-API messages from the airport concerned.

(3) Assuming that the Airport has better information about ARCTYP and REG than can be derived from FPL data, any positive value can be considered as a benefit of API messages.

Ref	Indicator Name	Target Value	Acceptable Range	Example
107.0	G_API_ARCTYP_Inconsistency	No target	Any value is an improvement	0%
107.1	G_API_REG_Inconsistency	No target	Any value is an improvement	5%

7.3.3 Taxi-time evaluation

(1) The purpose of these statistics is to evaluate the provided in block taxi-times of G-API messages.

(2) It compares the provided taxi-times with the average taxi-time as specified in the NM/CACD system.

(3) It identifies minimum and maximum taxi-times for a possible verification.

(4) Note that there are no specific quality criteria for taxi-times.

7.4 Performance Indicators (Predictability)

7.4.1 Filing Time Behaviour Indicators

(1) These indicators show the notice-time of the G-API messages compared to the:

- LDT time in the message
  The purpose of these statistics is to show the spread of notice times for the General API messages delivering LDT information. The notice time is the time duration that the provided LDT is in the future. For example: Is the LDT from the APIs 20 minutes in the future or 2 hours in the future? The statistics apply to both an ELDT and an ALDT.

  The G-API ALDT is derived from the G-API messages when flightStatusInbound has one of the values TXI, IBK, DBR, DBC.

- ALDT (known to ETFMS)
  The purpose of these statistics is to show the average prediction time of the provided data compared to the Actual Landing Time (ALDT) known to ETFMS, i.e. the LDT when the flight has status Terminated.

Ref	Indicator Name	Min [Min]	Max [min]	Average [min]		
				Target Value	Accep-table Range	Ex.
109.0	G-API AvgTime Before LDT			None yet	180 - 300	250

Ref	Indicator Name	Min [Min]	Max [min]	Average [min]		
				Target Value	Accep-table Range	Ex.
111.0	G-API AvgTime Before ALDT			None yet	180 - 300	250
111.1	TTA-API AvgTime Before ALDT			None yet	180 - 300	250
111.2	TTO-API AvgTime Before ALDT			None yet	180 - 300	250

7.4.2 Landing Time Predictability Accuracy Indicators - 1

(1) The Landing Time (LDT) Predictability is determined by calculating the absolute average differences between the ALDT and the ELDTs from the received G-API messages.

(2) Each indicator is calculated as follows:

Flight_Avg_Abs_ELDT_to_ALDT: avg(abs(ALDT– (ETFMS_ELDT)))
Flight_Min_Abs_ELDT_to_ALDT: min(abs(ALDT – ETFMS_ELDT))
Flight_Max_Abs_ELDT_to_ALDT: max(abs(ALDT – ETFMS_ELDT))
G-API_Avg_Abs_ELDT_to_ALDT: avg(abs(ALDT – API_ELDT))
G-API_Min_Abs_ELDT_to_ALDT: min(abs(ALDT – API_ELDT))
G-API_Max_Abs_ELDT_to_ALDT: max(abs(ALDT – API_ELDT))
G-API_Avg_Abs_ALDT_to_ALDT: avg(abs(ALDT – API_ALDT))
G-API_Min_Abs_ALDT_to_ALDT: min(abs(ALDT – API_ALDT))
G-API_Max_Abs_ALDT_to_ALDT: max(abs(ALDT – API_ALDT))

Ref	Indicator Name	Target Value [min]	Acceptable Range [min]	Example
111.10	Flight_Avg_Abs_ELDT_to_ALDT	0	<= 30	25
111.11	Flight_Min_Abs_ELDT_to_ALDT	0	<= 5	3
111.12	Flight_Max_Abs_ELDT_to_ALDT	0	<= 60	24
111.13	G-API_Avg_Abs_ELDT_to_ALDT	0	<= 15	12
111.14	G-API_Min_Abs_ELDT_to_ALDT	0	<= 5	3
111.15	G-API_Max_Abs_ELDT_to_ALDT	0	<= 60	24

111.16	G-API_Avg_Abs_ALDT_to_ALDT	0	<= 15	9
111.17	G-API_Min_Abs_ALDT_to_ALDT	0	<= 5	2
111.18	G-API_Max_Abs_ALDT_to_ALDT	0	<= 60	33

Notes:
1) These statistics are based upon the all received G-API message.
2) "Flight" includes FPL+DLA+CHG+DPI+FSA+CPR+… messages.

7.4.3 Landing Time Predictability Accuracy Indicators - 2

(1) The ELDT predictability from G-API shall be compared with ELDT predictions in ETFMS from other sources. The ELDT predictability from G-API shall be equal or better than the ELDT predictions in ETFMS.

(2) The comparison is done at the moment of reception of the G-API and it shall be done for each received G-API and for all flights (regulated and non regulated). It is shown in a graphical form and comparison is done by determining the percentage of messages that are within a pre-defined range.

(3) It starts with calculating the absolute average differences between the ELDT from G-API and the ELDT from ETFMS. Then the percentage of messages that are within a certain accuracy, for example 5 min is calculated.

(4) The Comparison between the different message types shall be done by comparing the Performance Indicator of each message type.

(5) The ELDT for ETFMS is derived from EFD messages.

Ref	Indicator Name 1)	Target Value	Acceptable Range	Example
111.20	FPL_Predictability_10min_Acc 2)	100%	No range	69%
111.21	G-API_Predictability_10min_Acc (FPL)	100%	>= FPL percentage	73%
111.22	G-API_Predictability_10min_Acc (ETFMS)	100%	>= ETFMS percentage	73%

(6) The requirement is that ELDT predictions from G-API shall always be equal or better than the ELDT already available in ETFMS from other sources.

7.5 ATFCM Behaviour

7.5.1 submitTargetTakeOffAPI

7.5.1.1 Introduction

(1) A prerequisite for **submitTargetTakeOffAPI** is that a specific ATFM measure is first applied and activated on the NM ETFMS system. It is this ATFM measure's RegulationId that is included in submitTargetTakeOffAPI requests alongside the other associated attributes.

(2) The exact process by which the ATFM measure and RegulationId manifest must be detailed in the client-NM ICD. This process may also include invoking the Regulation Proposal via B2B – Write Service which is covered separately under Doc ref 6.

(3) The specific measure types used by submitTargetTakeOffAPI are either Network Cherry Pick Measure or ATFM regulation. They are referred to in this document as TTA measure.

(4) From an operational view point, the TTA measure takes the place of a Network Measure (conventional regulation) to solve a traffic demand & capacity imbalance.

(5) It follows that the ATFCM behaviour that results from the ETFMS processing of the submitTargetTakeOffAPI service requests must not fall below the performance achieved by equivalent conventional regulation(s).

(6) The submitTargetTakeOffAPI evaluation process must therefore demonstrate, over time, that the TTA measure behaves comparably with a conventional regulation throughout the measure lifecycle.

7.5.1.2 Criteria

The ATFCM Behaviour criteria for the submitTargetTakeOffAPI are under development and will be discussed and agreed with the client during ICD development. The associated topics to be discussed include:

Safety - that during the lifetime of the target time measure, the arrival demand is smoothed and does not exceed available capacity;

- the target time measure interacts compatibly with ATFCM information updates (e.g., A-CDM) and other ATFCM measures in a manner that is comparable to interactions of conventional ATFM measures. (Proportion of flights with other Most Penalising Regulations).

Effectiveness - the target time measures use available capacity. Unused slots (wasted capacity) are kept to a minimum and do not exceed the quantity of wasted slots of comparable conventional regulations.

Efficiency – the target time measures are timely, stable and reliable:

- The lead time for Target time measure request and implementation is similar to that of a conventional regulation activation time [minimum 3 hours ahead of constraint].
- FMP and NMOC workflow and workload (coordination, implementation, monitoring, revision and mitigation) is like conventional regulations. [no onerous manual workarounds that disrupt workflow]
- Quantity of SAM and SRM messages and the magnitude of delay changes (per flight (CTOT) and to regulation delay total) in SRMs are comparable to equivalent conventional regulations.
- The quantity of measure revisions (rectifications) is comparable to conventional regulations.

Fairness – the ATFM flight ground delays are justified.

- The distribution and variability of Target times, average delay times and individual flight delays are equivalent distributions found in comparable conventional ATFM regulations.

7.6 Operational Readiness

7.6.1 Long Duration test

(1) In order for an Airport/ANSP to be ready to be integrated operationally with the ATM network, it is required that local operations are sufficiently mature.

(2) It is essential to have done sufficient testing with operational data with the NMOC in order to detect most special cases (e.g. night and weekend operations) and identify solutions.

(3) It is essential that most operations staff, airport, TWR, FMP… have become used to the newly introduced working methods and tools. The impact on the network of staff learning new working practices and inevitable making mistakes should be reduced to the absolute minimum.

(4) For these reasons, it is required that an Airport/ANSP provides API data for live traffic during an uninterrupted period of at least 7-14 days to the ETFMS test system before the APIs are sent to the ETFMS Operational system.

Ref	Indicator Name	Target Value	Acceptable value	Example
105.7	Long duration test	1 month	7 days	14 days

7.6.2 STAR processing

(1) The STAR and ALDT values are disseminated via CHMI, the NOP Portal and B2B Web Services, in order to increase the situational awareness of stakeholders of the departures.

(2) STAR provided by API messages are used in ETFMS to update flight profiles and are e.g. important for calculating a correct CTOT when arrival regulations are used.

(3) STAR and ALDT values of a sufficient quality are therefore necessary.

(4) The indicators used, measure the presence rate as well as the acceptance rate of the STAR and ELDT values in the different GAPI messages (in percentages):

API type	API MSg Count	With STAR		STAR selected		STAR could not be selected	
		Count	%	Count	%	Count	%
G-API							
TTA-API							
TTO-API							
TOTALs:							

Ref	Indicator Name	Target Value	Acceptable Range	Example
118.0	G-API STAR completeness	100%	>= 90%	100%
118.1	TTA-API STAR completeness	100%	>= 99%	100%
118.2	TTO-API STAR completeness	100%	>= 99%	100%

Ref	Indicator Name	Target Value	Acceptable Range	Example
118.3	G-API STAR not selected/rejected	0%	<= 20%	2%
118.4	TTA-API STAR not selected/rejected	0%	<= 20%	2%

118.5	TTO-API STAR not selected/rejected	0%	<= 20%	2%

7.6.3 API B2B Update threshold Error

(1) The purpose of these statistics is to show the percentage of API messages that exceeded the NM B2B threshold limits error. Exceeding the target value of 0% requires remedial action from the client.

(2) Overloads could occur during e.g. Runway changes or stand re-allocations.

Ref	Indicator Name	Target Value	Acceptable Range	Example
123.0	API Overload	0%	0%	0%

7.6.4 Jumping LDT values

(1) The purpose of these statistics is to identify and measure the stability of LDT predictions.

(2) LDT predictions that jump forward and backward cause instability of traffic predictions for FMPs and should be prevents as much as possible.

Ref	Indicator Name	Target Value	Acceptable Range	Example
125.0	Jumping G-API LDT	0%	<= 5%	2%

8 Contacts

(1) For details on Project management issues, messages specifications and Operational matters related to DPI and G-API Evaluations:

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Annex 1

(3) The following table provides an overview of all the steps to be taken for a DPI and API Operational Evaluation, including an estimation of the duration.

Ref nr	Description	Est Duration DPI		Est Duration API	
		[days]	[Wks]	[days]	[Wks]
T1	Communication and Message Syntax		0.4		0.4
T1.1	Actual tests	1		1	
T1.2	Report writing and Review	1		1	
T2	Evaluation of Live Data				
T2.1	Evaluation - I		4		4
T2.1.1	Execution, data analysis, report writing by NM	5		5	
T2.1.2	Analysis and Review of the report by Airport	5		5	
T2.1.3	Possible Adjustment of system and procedures	10		10	
T2.2	Evaluation - II		4		4
T2.2.1	Execution, data analysis, report writing by NM	5		5	
T2.2.2	Analysis and Review of the report by Airport	5		5	
T2.2.3	Possible Adjustment of system and procedures	10		10	
T2.3	Evaluation - III		4		4
T2.3.1	Execution, data analysis, report writing by NM	5		5	
T2.3.2	Analysis and Review of the report by Airport	5		5	
T2.3.3	Possible Adjustment of system and procedures	10		10	
T2.4	DPI Operational Evaluation Review meeting	1	0.2	1	0.2
T3	B2B Write Validation for release of OPS Certificate		3.2		3.2
T3.1	Provision of live data in PRE-OPS	10		10	
T3.2	Data analysis, Report writing and review by NM B2B Team	5		5	
T3.3	Review by ANI, CDM or Advanced ATC TWR Airport	1		1	
T4	Operational Trial		3		1
T4.1	Preparations	10			
T4.2	Operational Trial - I	1		1	
T4.3	Analysis, Report writing and review - I	1		1	
T4.4	Operational Trial – II (if required)	1		1	
T4.5	Analysis, Report writing and review - II	1		1	
T4.6	Review and analysis of the report by the Airport	1		1	
T5	Operations (including preparation for Operations)		4		3
T5.1	Continous provision of Operational DPIs 1)	10		10	
T5.2	GoNoGo Decision	1		1	
T5.3	Final preparations for Operations	9		4	
T6	Post Operations Support		4		4
T6.1	Post Operations support	20		20	

TOTAL:	134	26.8	119	23.8

Notes:
1) if DPIs and/ir APIs have been provided on a continuous basis during the previous tests, this step can be skipped.

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