

# ICAO FF-ICE WORKSHOP

*A SKEYES VIEW ON FF-ICE*

Alexandros Kokkinolambos

17 February 2026

member of FABEC



# OBJECTIVE

The **objective** of this presentation is to present the **journey and progress** of the FF-ICE implementation at skeyes:

- Introduce **skeyes** and identify the pillars supporting the implementation of FF-ICE.
- Understand the **SWIM architecture**, technical infrastructure and FF-ICE service consumption.
- Delve into the consumption and processing of **FF-ICE Data**.
- Present the **FF-ICE Roadmap** and key target dates.
- Highlight the **risks and challenges** in the implementation of FF-ICE.

*The implementation of FF-ICE is an ongoing dynamic process in which skeyes is coordinating with all the relevant stakeholders and its system providers.*



# INTRODUCTION

## INTRODUCTION TO SKEYES

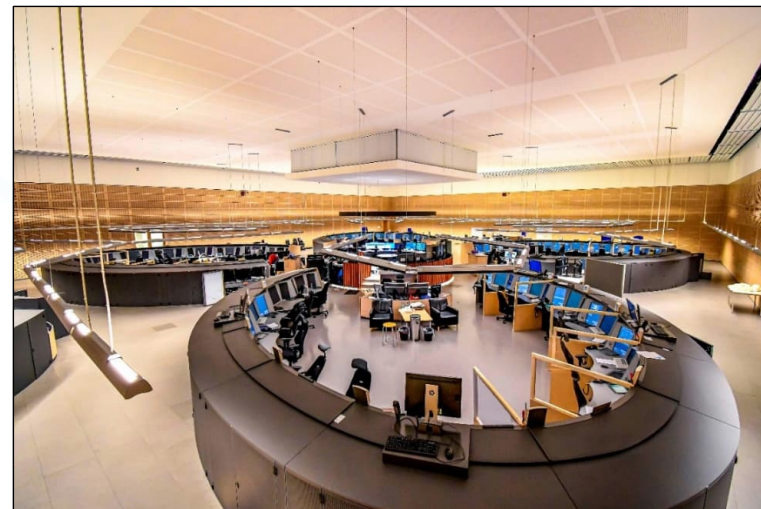
### WHO ARE WE

Skeyes is the **Belgian air navigation and traffic service provider (ANSP)** for the civil airspace for which the Belgian State is responsible.

- **Belgium:** In Belgium, skeyes' airspace extends to flight level 245 including the control of the airports of Brussels, Charleroi, Liege, Antwerp, Ostend and Kortrijk.
- **Luxembourg:** In the Grand Duchy of Luxembourg, skeyes controls the airspace between flight levels 145 or 165 up to flight level 245.

### KEY FACTS AND FIGURES

- **946,768** flights managed by skeyes in 2024.
- **99.4%** flights handled punctually by skeyes.
- **+4%** growth in air traffic in 2024 compared to 2023.
- **982** number of employees.



# FF-ICE TRANSITION

## UNDERSTANDING THE CHANGE

# FF-ICE UPGRADE

## INFRASTRUCTURE

### SWIM INFRASTRUCTURE

- **Technical Infrastructure:** The SWIM TI is a collection of software and hardware used to allow the provision of information services.
- **Information Exchange Models:** The exchange of FF-ICE data is done via the Flight Information Exchange Model (FIXM).
- **Information Services:** The FF-ICE services, including the Data Publication Service, Flight Data Request Service, Notification Service are provided by the NM.
- **SWIM Services:** The FF-ICE services are registered, defined and described in the SWIM Registry.

## EXCHANGE MODELS

### FLIGHT INFORMATION EXCHANGE MODEL

- **FIXM Core:** FIXM Core version 4.3.0 provides globally harmonized data structures, supplemented by FIXM Extensions and restricted by FIXM Applications.
- **FIXM FF-ICE Application:** FIXM Applications, such as the, the FF-ICE Application version 1.1.0 are specific flight data structures used for specific contexts.
- **NM Extension:** The *NM Extension* is an extension to FIXM that provides the elements exchanged regionally in Europe.
- **TopSky-ATC One Extension:** Enables the export of specific data by the TopSky-ATC One system.

Elaboration of SWIM Infrastructure

## SYSTEM UPGRADES

### FF-ICE SERVICES

- **System Identification:** The systems requiring upgrades or deployment to ensure FF-ICE capability have been identified. These include the main ATC system, the TWR system, and the Traffic Complexity Tool.
- **FF-ICE Data Consumption:** The FF-ICE services to be consumed by each system have been defined in accordance with the CPI Regulation and aligned with the specific functional requirements of each system.
- **FF-ICE Data Processing:** The FF-ICE data items to be consumed, processed and used for operational purposes by each system have been detailed and elaborated.

Elaboration of FF-ICE Data Exchanges

### TECHNICAL INFRASTRUCTURE

SWIM Infrastructure

### DATA EXCHANGES

Core, Applications, and Extensions

### FF-ICE DATA

Data Elaboration

# FF-ICE/R1 SERVICES

## PLANNING SERVICE

NOT AVAILABLE

The **Planning Service** is an optional service, and it is **not included** in the European implementation of FF-ICE/R1. The planning service is currently at a planning phase.

## TRIAL SERVICE

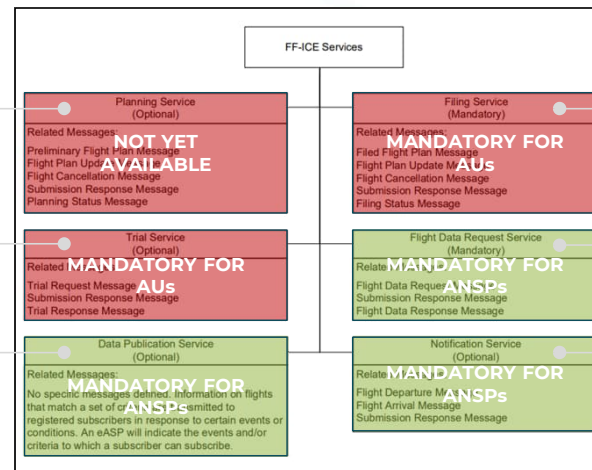
MANDATORY

The **Trial Service** allows the submission of **what-if requests** to EUROCONTROL Network Manager to assess potential flight plans or changes without creating or altering flight plans. It covers the IFPZ area, and targets **AUs** and **CFSPs**.

## DATA PUBLICATION SERVICE

MANDATORY

The **Data Publication Service** publishes flight plans to EUROCONTROL Network Manager's stakeholders using the **FIXM data model**, adhering to ICAO FF-ICE/R1 specifications.



## FILING SERVICE

MANDATORY

The **Filing Service** supports the **submission, update, and cancellation** of flight plans to EUROCONTROL Network Manager, using the **FIXM data model** and **NM extensions**.

## FLIGHT DATA REQUEST SERVICE

MANDATORY

The **Flight Data Request Service** supports obtaining FF-ICE **flight plan information, supplementary data, and filing status**, in line with ICAO FF-ICE/R1 specifications. It targets **ANSPs** within the IFPZ. This is the equivalent service of **RQP/RQS**.

## NOTIFICATION SERVICE

MANDATORY

The **Notification Service**, supports the submission of **departure and arrival** notifications to EUROCONTROL Network Manager. It targets **ANSPs**. This is the equivalent service of **ARR** and **DEP**.

**SWIM INFRASTRUCTURE**

**SKEYES ARCHITECTURE**

# SWIM INFRASTRUCTURE

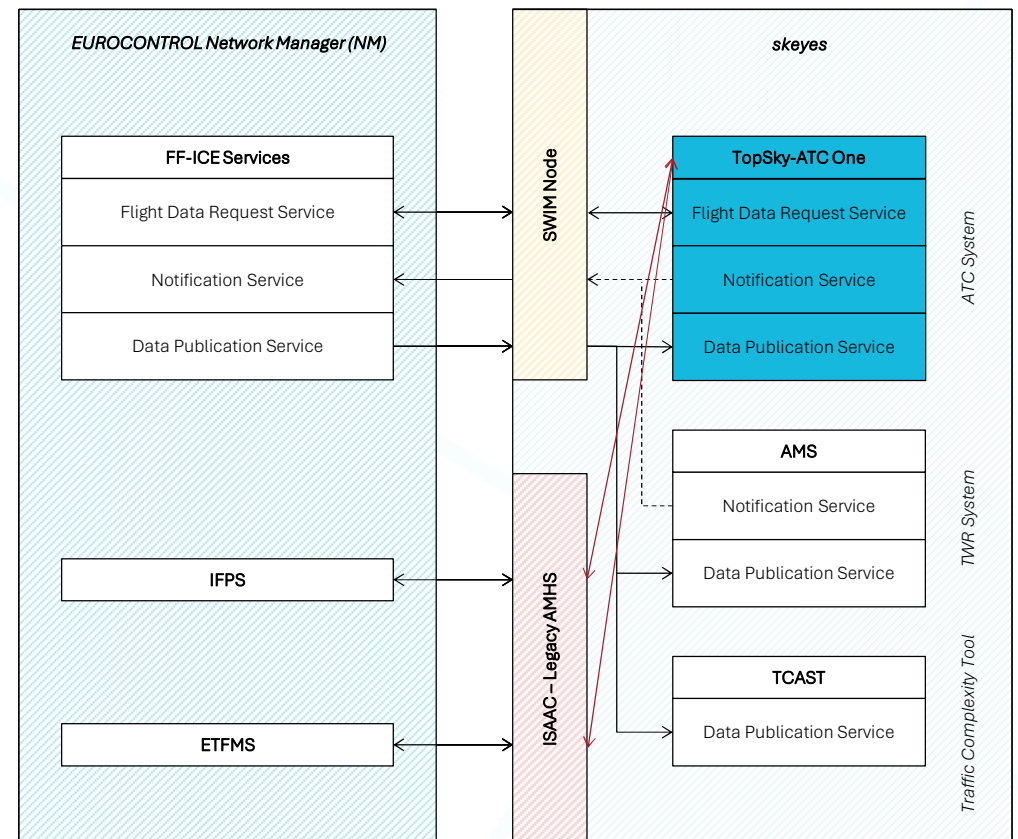
## SKEYES SWIM ARCHITECTURE

### SWIM NODE

The **SWIM infrastructure** of skeyes is built around a **SWIM node** that serves as the interface between internal systems and the external SWIM environment. The SWIM-compliant systems within skeyes include the main **ATC system (TopSky-ATC One)**, the **Tower System (AMS)**, and the **Traffic Complexity Tool (TCAST)**.

### FF-ICE COMPLIANT SYSTEMS

- **ATC System – TopSky-ATC One:** The TopSky-ATC One system is planned to consume eFPLs via the Data Publication Service, exchanging Flight Data Requests via the Flight Data Request Service and transmitting Arrival and Departure Notifications via the Notification Service.
- **TWR System – AMS Tower System:** The AMS Tower System is planned to be capable of transmitting Arrival and Departure Notifications via the Notification Service and consume eFPLs via the Data Publication Service.
- **Traffic Complexity Tool – TCAST:** The Traffic Complexity Assessment and Simulation Tool (TCAST) is planned to be compliant with the consumption of eFPLs via the Data Publication Service.



# SWIM INFRASTRUCTURE

## LEGACY AMHS/AFTN INTERFACE

### MIXED MODE OPERATIONS

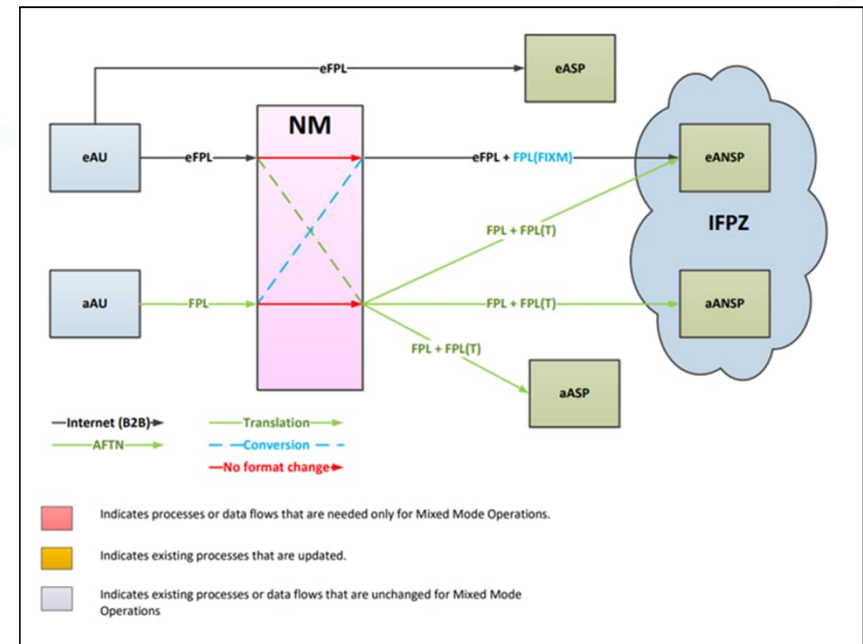
The implementation of FF-ICE and its adoption within Europe involves an **extensive transition period**, during which mixed modes of operation must be supported. Skeyes **architecture** is adapted to **support the mixed mode operations**.

- **Translation:** A process for changing submitted FF-ICE flight plan data into the equivalent FPL 2012 data format and structure.
- **Conversion:** A process for changing submitted FPL 2012 flight plan into the equivalent FIXM data format and structure.

### CONTINGENCY

For **contingency purposes**, and in the event of a SWIM interface outage, the option to retain the AMHS/AFTN channels for the exchange of legacy IFPS messages is currently **under assessment**.

- **IFPS Messages:** TopSky-ATC One is capable of transmitting and receiving FPL messages. In addition, it supports the transmission of CHG, CNL, DLA, DEP, ARR, RQP, RQS, SPL, and AFP messages, as well as the reception of APL and ACH messages.



# SWIM INFRASTRUCTURE

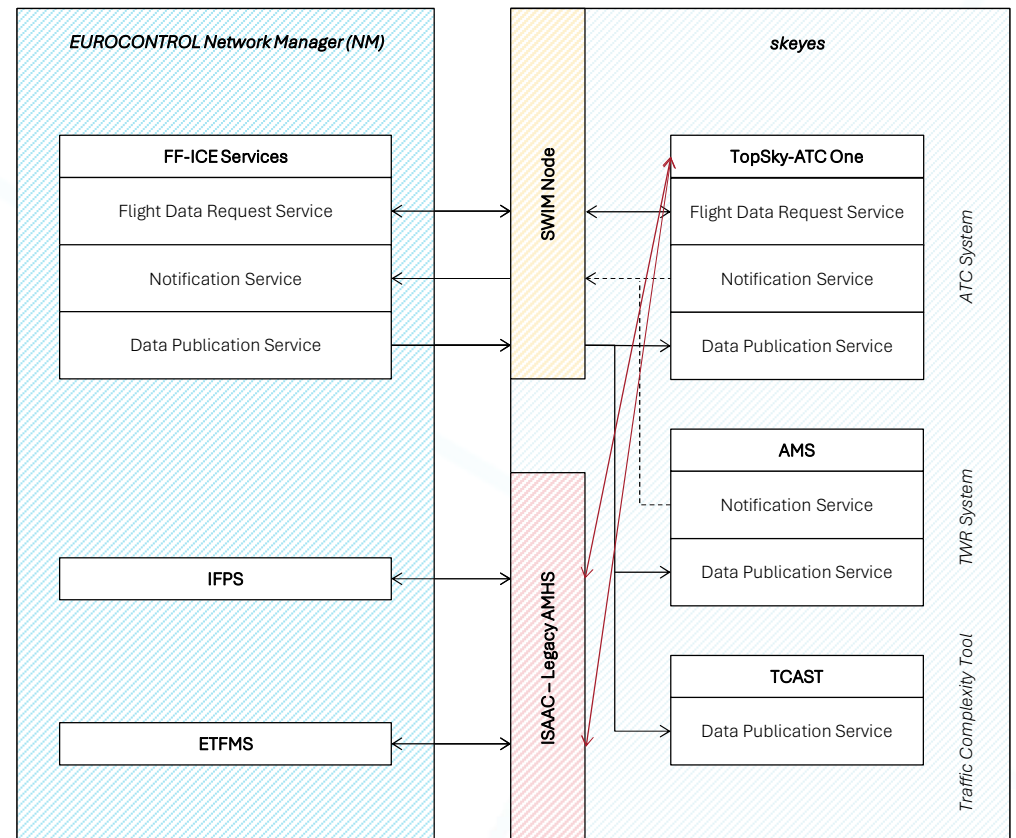
## MIXED MODE OPERATIONS

### IFPS MESSAGES

- **AFP Message:** The AFP message is transmitted through ISAAC by TopSky-ATC One to the EUROCONTROL Network Manager in ICAO format via AMHS.
- **RQP and RQS Messages:** When the NM holds an FPL in its Flight Data Record (FDR) and a Flight Data Request without a GUF1 is submitted, the request is rejected with a list of matching flights and an instruction to submit an RQP/RQS.
- **ARR and DEP Messages:** When the NM holds an FPL in its FDR, Arrival and Departure Notifications require a GUF1 and cannot be constructed without one. In such cases, a DEP or ARR message must be submitted instead.

### ETFMS MESSAGES

- **FSA Message:** FSA messages are transmitted through ISACC by TopSky-ATC One to the EUROCONTROL Network Manager in ADEXP format via AMHS.
- **Slot Messages:** Slot messages, including SAM, SRM, SLC, FLS, and DES, are received by TopSky-ATC One via ISAAC in ADEXP format through AMHS.





**FF-ICE DATA**

**TRANSITION TO eFPL**

# FF-ICE DATA

**FLIGHT PLAN  
PLAN DE VOL**

PRIORITY: **FF** ADDRESS(S):

FILING TIME: ORIGINATOR:

3 MESSAGE TYPE: **(FPL)** 7 AIRCRAFT IDENTIFICATION: 8 FLIGHT RULES: TYPE OF FLIGHT:

9 NUMBER: TYPE OF AIRCRAFT: WAKE TURBULENCE CAT.: 10 EQUIPMENT:

13 DEPARTURE AERODROME: TIME: 15 CRUISING SPEED: LEVEL: ROUTE:

16 DESTINATION AERODROME: 17 ALTN AERODROME:

18 OTHER INFORMATION:

19 ENDURANCE: PERSONS ON BOARD: EMERGENCY RADIO:

SURVIVAL EQUIPMENT: JACKET(S):

NUMBER: CAPACITY: COVER: COLOUR:

REMARKS:

PILOT-IN-COMMAND:

FILED BY / Déposé par:

**ICAO 2012 FPL**

**SUNSET DATE OF 2034**



```

1 <?xml version="1.0" encoding="utf-8"?>
2 <S:Envelope xmlns:S="http://schemas.xmlsoap.org/soap/envelope/">
3 <S:Body>
4 <ffice:FilingRequest xmlns:ns6="http://www.eurocontrol.int/nm/fixm/ext/1.4" xmlns:ns5="
5 "http://www.fixm.aero/flight/4.2" xmlns:ns7="http://www.eurocontrol.int/nm/fixm/ext/1.3" xmlns:ns8="
6 "http://www.eurocontrol.int/nm/fixm/app/ffice/1.0" xmlns:ffice="eurocontrol/cfmu/b2b/fficeServices"
7 xmlns:cm="eurocontrol/cfmu/b2b/CommonServices" xmlns:ns4="http://www.fixm.aero/base/4.2" xmlns:xs1="
8 "http://www.w3.org/2001/XMLSchema-instance">
9 <endUserId>tstxb2b7</endUserId>
10 <sendTime>2021-02-09 13:27:17</sendTime>
11 <choice>
12 <ns5:flight xmlns:ns5="http://www.eurocontrol.int/nm/fixm/ext/1.4">
13 <ns5:aircraft>
14 <ns5:aircraftAddress>C01074</ns5:aircraftAddress>
15 <ns5:aircraftApproachCategory>D</ns5:aircraftApproachCategory>
16 <ns5:aircraftType>
17 <ns5:icaoAircraftTypeDesignator>B789</ns5:icaoAircraftTypeDesignator>
18 </ns5:aircraftType>
19 <ns5:capabilities>
20 <ns5:communicationCapabilityCode>E3 H M1 P2 Y</ns5:communicationCapabilityCode>
21 <ns5:datalinkCapabilityCode>J1 J2 J4 J5</ns5:datalinkCapabilityCode>
22 <ns5:otherDatalinkCapabilities>FANS2FDC</ns5:otherDatalinkCapabilities>
23 <ns5:selectiveCallingCode>RQCM</ns5:selectiveCallingCode>
24 </ns5:capabilities>
25 <ns5:navigation>
26 <ns5:navigationCapabilityCode>A D G I W X</ns5:navigationCapabilityCode>
27 <ns5:otherNavigationCapabilities>RNP2</ns5:otherNavigationCapabilities>
28 <ns5:performanceBasedCode>A1 B1 C1 D1 L1 O2 S2 T1</ns5:performanceBasedCode>
29 </ns5:navigation>
30 <ns5:standardCapabilities>STANDARD</ns5:standardCapabilities>
31 <ns5:surveillance>
32 <ns5:otherSurveillanceCapabilities>260B</ns5:otherSurveillanceCapabilities>
33 <ns5:surveillanceCapabilityCode>B2 D1 L G1</ns5:surveillanceCapabilityCode>
34 </ns5:surveillance>
35 <ns5:survival>
36 <ns5:emergencyRadioCapabilityType>EMERGENCY_LOCATOR_TRANSMITTER</ns5:emergencyRadioCapabilityType>
37 <ns5:lifeJacketType>VERY_HIGH_FREQUENCY</ns5:lifeJacketType>
38 <ns5:survivalEquipmentType>MARITIME</ns5:survivalEquipmentType>
39 </ns5:survival>
40 </ns5:capabilities>
41 <ns5:registration>CDA001</ns5:registration>
42 <ns5:wakeTurbulence>H</ns5:wakeTurbulence>
43 </ns5:aircraft>
44 <ns5:arrival>
45 <ns5:destinationAerodrome>
46 <ns4:locationIndicator>CYYZ</ns4:locationIndicator>
47 </ns5:destinationAerodrome>

```

# FF-ICE DATA

## FF-ICE ADDITIONAL DATA USED IN IOC

### GLOBAL UNIQUE FLIGHT IDENTIFIER – GUFU

- **FIXM Core:** The Global Unique Flight Identifier (GUFU) is provided in the eFPL and is part of the FIXM Core.
- **Message Association:** TopSky-ATC One will consume and process the GUFU to associate incoming messages with the corresponding eFPL stored in the system.

### OPERATOR FLIGHT PLAN VERSION – OFPV

- **eFPL Version Identification:** The OFPV, used together with the GUFU, enables the system to distinguish between new and outdated eFPL versions. This mechanism is essential given the removal of the traditional concept of a single FPL being incrementally updated.

### AIRCRAFT TAKE-OFF MASS

- **BADA Consistency:** The received Take-off Mass value will be validated against the BADA model. *If consistent* it will be used with the BADA model to compute the trajectory, potentially improving climb profile accuracy, sector sequence prediction, and MTCD calculations. *If inconsistent* a default BADA-based trajectory will be used instead.

```
<?xml version="1.0" encoding="utf-8"?>
<S:Envelope xmlns:S="http://schemas.xmlsoap.org/soap/envelope/">
  <S:Body>
    <ffice:FilingRequest xmlns:ns6="http://www.eurocontrol.int/nm/fixm/ext/1.4" xmlns:ns5="http://www.fixm.aero/flight/4.2" xmlns:ns7="http://www.eurocontrol.int/nm/fixm/ext/1.3" xmlns:ns8="http://www.eurocontrol.int/nm/fixm/app/ffice/1.0" xmlns:ffice="eurocontrol/ofam/b2b/fficeServices" xmlns:cm="eurocontrol/ofam/b2b/CommonServices" xmlns:ns4="http://www.fixm.aero/base/4.2" xmlns:xs1="http://www.w3.org/2001/XMLSchema-instance">
      <endUserId>tstxb2b7</endUserId>
      <sendTime>2021-02-09 13:27:17</sendTime>
      <choice>
        <cm:FiledFlightPlan_v1_0>
          <ns5:flight xs1:type="ns5:Nm_FficeFP_FlightType">
            <ns5:aircraft>
              <ns5:aircraftAddress>C01074</ns5:aircraftAddress>
              <ns5:aircraftApproachCategory>D</ns5:aircraftApproachCategory>
              <ns5:aircraftType>
                <ns5:type>
                  <ns5:icaoAircraftTypeDesignator>B789</ns5:icaoAircraftTypeDesignator>
                </ns5:type>
              </ns5:aircraftType>
              <ns5:capabilities>
                <ns5:communication>
                  <ns5:communicationCapabilityCode>E3 H M1 P2 Y</ns5:communicationCapabilityCode>
                  <ns5:datalink>
                    <ns5:datalinkCapabilityCode>J1 J2 J4 J5</ns5:datalinkCapabilityCode>
                  </ns5:datalink>
                  <ns5:otherDatalinkCapabilities>FANS2PDC</ns5:otherDatalinkCapabilities>
                  <ns5:selectiveCallingCode>RQCM</ns5:selectiveCallingCode>
                </ns5:communication>
                <ns5:navigation>
                  <ns5:navigationCapabilityCode>A D G I W X</ns5:navigationCapabilityCode>
                  <ns5:otherNavigationCapabilities>RNP2</ns5:otherNavigationCapabilities>
                  <ns5:performanceBasedCode>A1 B1 C1 D1 L1 O2 S2 T1</ns5:performanceBasedCode>
                </ns5:navigation>
                <ns5:standardCapabilities>STANDARD</ns5:standardCapabilities>
                <ns5:surveillance>
                  <ns5:otherSurveillanceCapabilities>260B</ns5:otherSurveillanceCapabilities>
                  <ns5:surveillanceCapabilityCode>B2 D1 L G1</ns5:surveillanceCapabilityCode>
                </ns5:surveillance>
                <ns5:survival>
                  <ns5:emergencyRadioCapabilityType>EMERGENCY_LOCATOR_TRANSMITTER</ns5:emergencyRadioCapabilityType>
                  <ns5:lifeJacketType>VERY_HIGH_FREQUENCY</ns5:lifeJacketType>
                  <ns5:survivalEquipmentType>MARITIME</ns5:survivalEquipmentType>
                </ns5:survival>
              </ns5:capabilities>
              <ns5:registration>CDA001</ns5:registration>
              <ns5:wakeTurbulence>H</ns5:wakeTurbulence>
            </ns5:aircraft>
            <ns5:arrival>
              <ns5:destinationAerodrome>
                <ns4:locationIndicator>CYYZ</ns4:locationIndicator>
              </ns5:destinationAerodrome>
            </ns5:arrival>
          </cm:FiledFlightPlan_v1_0>
        </choice>
      </S:FilingRequest>
    </S:Body>
  </S:Envelope>
</pre>
```

# FF-ICE DATA

## FF-ICE ADDITIONAL DATA NOT USED IN IOC

### CLIMB AND DESCENT SPEED SCHEDULES

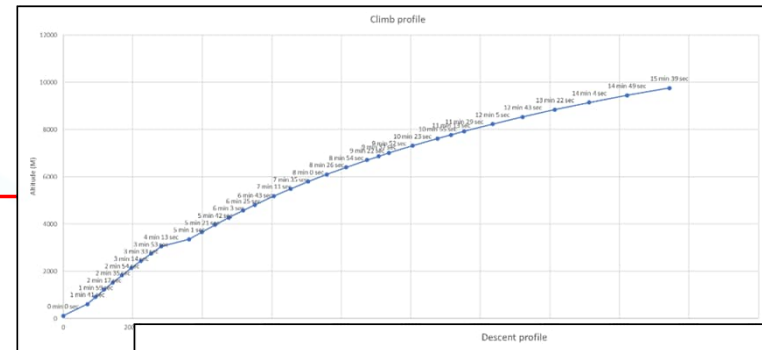
- **BADA Model:** Further analysis of the available data may support the adoption of the Climb and Descent Speed Schedule, provided that a suitable operational use case is identified.

### CLIMB AND DESCENT PROFILES

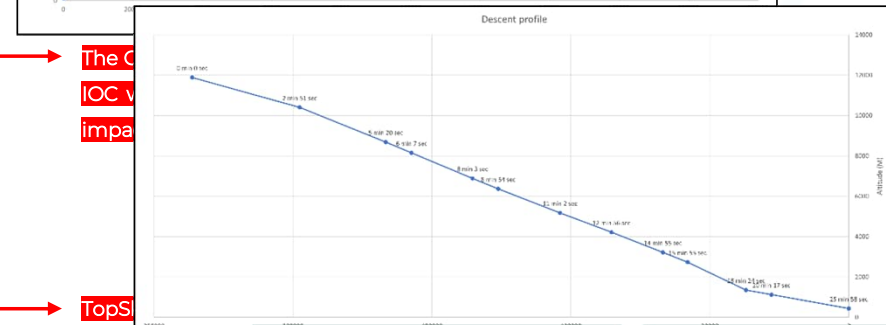
- **Total Energy Model:** TopSky-ATC One uses the BADA data and the Total Energy model to generate an accurate 4D trajectory. This trajectory computation incorporates the following flight plan constraints, meteorological data, local ATC constraints and ATC clearances that directly influence the 4D trajectory.

### 4D TRAJECTORY

- **Intermediate RFLs:** The eFPL includes intermediate RFLs that do not conflict with existing airspace or capacity restrictions. The system subsequently computes its own accurate trajectory while incorporating these received constraints.
- **Discrepancy Warning:** In certain cases, a discrepancy warning may be triggered between the received 4D trajectory and the system-computed 4D trajectory.



Speed Schedules within  
trajectory computation.

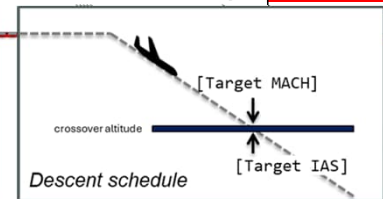
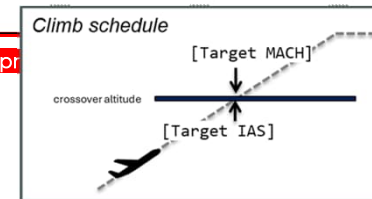


The C  
IOC v  
impa

ky-ATC One  
and negative

TopS  
trajec  
may ultimately pr

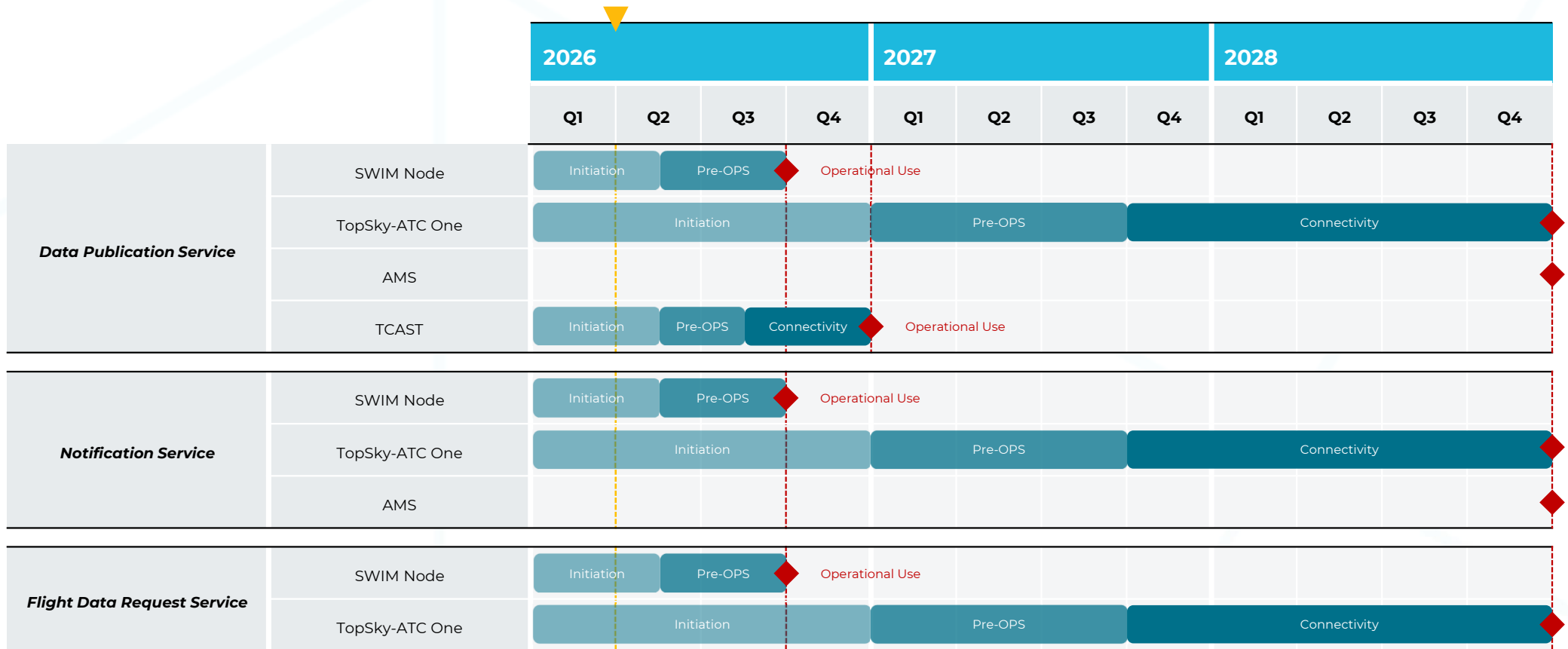
provided 4D



# FF-ICE ROADMAP

## IMPLEMENTATION TIMELINE

# FF-ICE ROADMAP



**CONCLUSIONS**

**RISK AND CHALLENGES**

# RISKS AND CHALLENGES

## RISKS AND CHALLENGES

### TECHNICAL AND OPERATIONAL CONCERNS

- **Complexity of Mixed Mode Operations:** The ATM system must simultaneously process both FF-ICE and legacy data during the transition period, increasing system and operational complexity.
- **Absence of Route Information in eFPL:** In cases where the eFPL does not contain a Route Text, the method for route decoding and subsequent handling by the FDO remains unclear.
- **FDO Workload and eFPL Decoding:** The process for decoding and presenting eFPLs to FDOs may introduce additional workload, especially when modifying routes or issuing Flight Data Requests without a GUF, leading to multi-step retrieval processes.
- **Pre-OPS Validation:** Clarification is needed on whether the Pre-OPS environment provides sufficient end-to-end testing before OPS activation and if it receives representative OPS flight plans to support validation and shadow operations.
- **Contingency Use of Legacy Capabilities:** Analysis is required on whether TWR and Traffic Complexity systems will retain legacy message-handling capabilities and whether legacy fallback channels will remain available.



# NEXT STEPS

## INFRASTRUCTURE

### SWIM NODE

- **Incremental Approach:** The SWIM Node implementation is foreseen in two increments:
- **Increment 1:** It is planned for Q2 2026 and will cover, the connection to the NM and pre-OPS testing and validation for the FF-ICE Services.
- **Increment 2:** It is planned for Q4 2026 and will include the operational validation for the remaining SWIM services.

## PRE-OPS

### PRE-OPS TESTING

- **SWIM Node:** Pre-OPS testing is foreseen for Q2 2026, during the first implementation increment.

### OPERATIONAL VALIDATION

- **SWIM Node:** The operational validation for the NM B2B *Read Services* is foreseen for Q2 2026.
- **ATM System:** The operational validation for the NM B2B *Write services* is foreseen for Q3 2027.

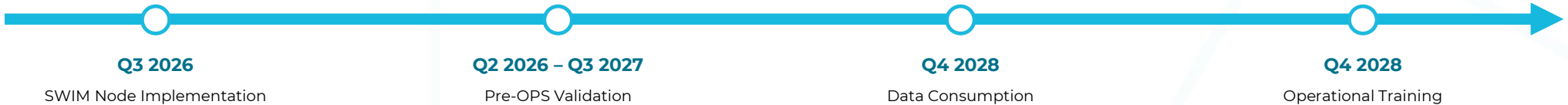
## DATA CONSUMPTION

### FF-ICE CAPABLE SYSTEMS

- **ATM System:** Compliant with the Data Publication, Flight Data Request and Notification Services by Q4 2028. A phased approach to FF-ICE data consumption is planned.
- **TWR System:** Compliant with the Data Publication and Notification Services by Q4 2028.
- **Traffic Complexity Tool:** Compliant with the Data Publication Service by Q4 2026.

## TRAINING

### TRAINING AND OPS PROCEDURES



**THANK YOU**

**QUESTIONS & FEEDBACK**