

“FF-ICE Implementation into ATC systems” by ANS CR

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ICAO EUR-NAT FF-ICE Workshop

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FF-ICE ANSP Implementation in Europe – ATM systems upgrade

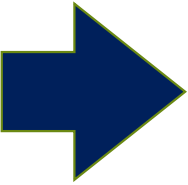
What is needed for ANSP FF-ICE implementation in Europe – under NMOC umbrella

- Local ATM system upgrade
 - To receive/send FF-ICE data – to be able to use NMOC B2B FF-ICE services
 - Publication – distribution of FF-ICE flight plans
 - Notification – new services for DEP, ARR provision
 - Data Request – RQP replacement + new FPL download functionality
 - Data processing (FDPS, HMI)
 - To modify local FDPS to be able to process FIXM flight plans (both converted FPL2012 into FIXM and eFPL), together with processing of legacy FL2012 AFTN data
 - FDPS modifications (e.g. trajectory algorithm, HMI changes)
- NMOC support for FF-ICE implementation - ANSP:
 - FF-ICE B2B services
 - Transition period support – conversion/translations between FF-ICE flight plans and ICAO2012 flight plans
 - PREOPS platform support – features for test and development

FF-ICE ANSP Implementation in Europe – data formats

FPL (ICAO FPL2012)

(FPL-TEST123-IS
-A320/M-SDE2E3FGHIJ1RWXYZ/LB1
-LFB01735
-N0365F240 LACOU DCT CHALA DCT CNA DCT
MANAK
-LFRS0043 LFRN
-PBN/A1B1C1D1O1S2 NAV/RNP2 DAT/V
DOF/230620 REG/FABCD EET/LFFF0007
LFRR0034)



eFPL or converted FPL2012 (FIXM)

```
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="http://www.fixm.aero/flight/4.3" xmlns:ns6="http://www.fixm.aero/ffice/1.1/bugfix/2024_04_30"
xmlns:ns7="http://www.eurocontrol.int/nm/fixm/ext/1.5" xmlns:ns9="http://www.fixm.aero/ans/ffice/1.1"
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  <timestamp>2024-12-16 00:22:06 364</timestamp>
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```

From relatively short and readable FPL2012 format into much bigger FIXM (Flight Information Exchange Model) format using XML (eXtensible Markup Language)

Two formats of NMOC distribution to ANSP:

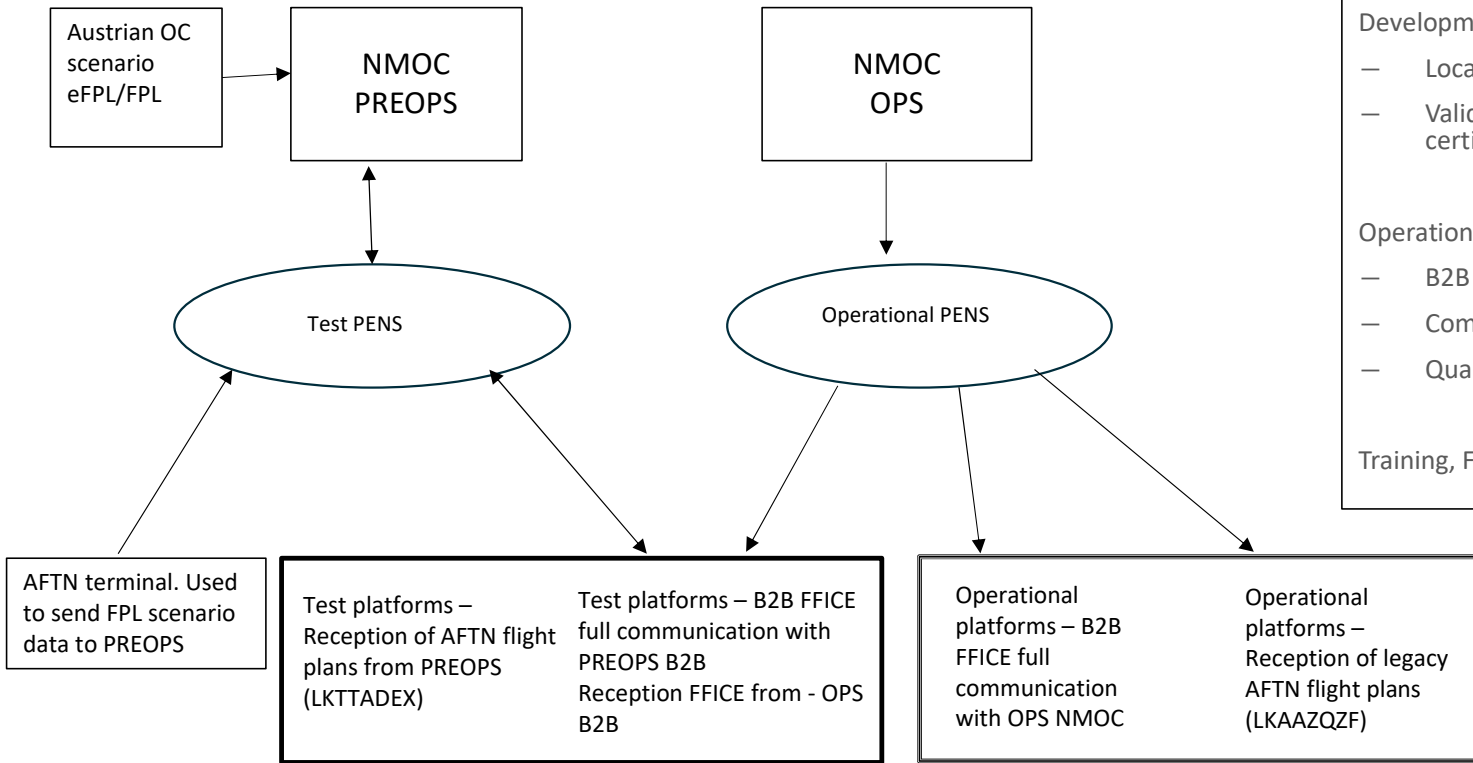
- eFPL (Electronic Flight Plans) - include detailed data like 4D trajectory and performance metrics – filed as FF-ICE flight plan by AO.
- FIXM converted FPL2012 – includes FPL2012 items + NMOC calculated trajectory - filed as FPL2012 by AO

ANS CR FF-ICE implementation architecture

Implementation architecture overview:

- Two clients to communicate flight plan related data – main ATM system (TopSky), fallback/supporting system (ESUP)
- Each of them will have its own connection to NMOC B2B and set of certificates (PREOPS/OPS) for B2B FF-ICE services and FlightData services
- Communication path – PENS
- Services: Publication, Notification, Data Request (limited to initial download) services (FF-ICE + Flight)
- Internal system architecture:
 - TopSky – new SWIM node within UBSS distributed middleware, node will maintain FF-ICE database, feeding data to existing FDPS (enhanced with new data items)
 - ESUP – SW modules in FDPS server for B2B communication
- Handling of erroneous FPL(FIXM) messages which need FDO manual intervention – converted to ADEXP and passed to FDO

ANS CR FF-ICE validation configuration



Scope of tests

Development, NMOC integration

- Local tests with PREOPS, part of SAT
- Validation tests with NMOC – PREOPS (to get OPS certificate)

Operational test

- B2B services – stability, quality
- Completeness of FF-ICE data compared to legacy FPLs
- Quality of FIXM data (comparison to legacy FPLs)

Training, Final shadow tests

FF-ICE functional scope, status

Implementation steps, scope:

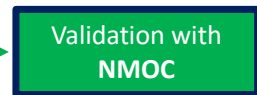
- Basic FF-ICE processing elements: SWIM interface (NMOC B2B services), eFPL/FIXM processing (FDPS upgrade)
- Operational improvements:
 - FDPS trajectory - vertical profile algorithm will use TOW (instead of fixed BADA parameter)
 - Planned trajectory from eFPL (with TOC/TOD) will be presented on ATCO screen (with TOC/TOD, on controller request)
- Future development – level of eFPL integration/synergy with EPP (ADS-C) in Thales TopSky One product - 2032

Status:

- Contracts were signed end of 2023/beginning 2024, SATs completed, PREOPS certificates available from end of 2024
- READ tests with NMOC completed
- OPS certificate ESUP available, OPS certificate TopSky delivery in progress (READ service)
- Write tests with NMOC for Notification service to be done.
- Full operations planned around end of Q1/26

TopSky – Publication services

- ✓ 12/2023 – Contract signed (Thales)
- ✓ 09/2024 – PREOPS certificate available
- ✓ 01/2025 – CDR completed
- ✓ 06/2025 – FAT completed
- ✓ 09/2025 – SAT completed
- ✓ **12/2025 – READ NMOC test**
- OPS certificate



ESUP – Publication and Notification services

- ✓ 03/2024 – Contract signed (CS Soft)
- ✓ 09/2024 – PREOPS certificate available
- ✓ 12/2024 – SAT1 (READ) completed
- ✓ **01/2025 – READ NMOC test**
- ✓ 07/2025 – OPS certificate READ
- ✓ 09/2025 – SAT2 (WRITE)
- ✓ **02/2026 – WRITE NMOC test**
- OPS certificate WRITE

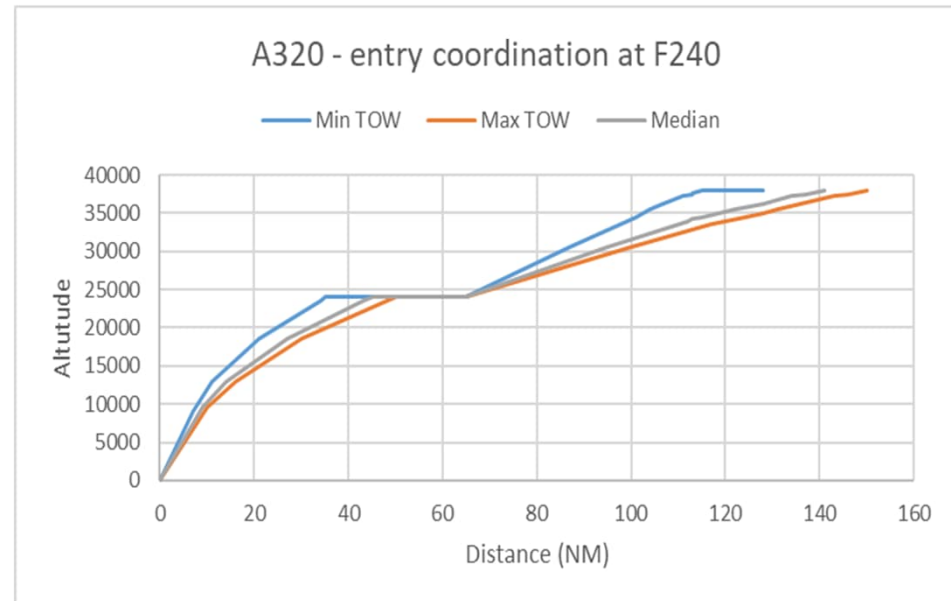
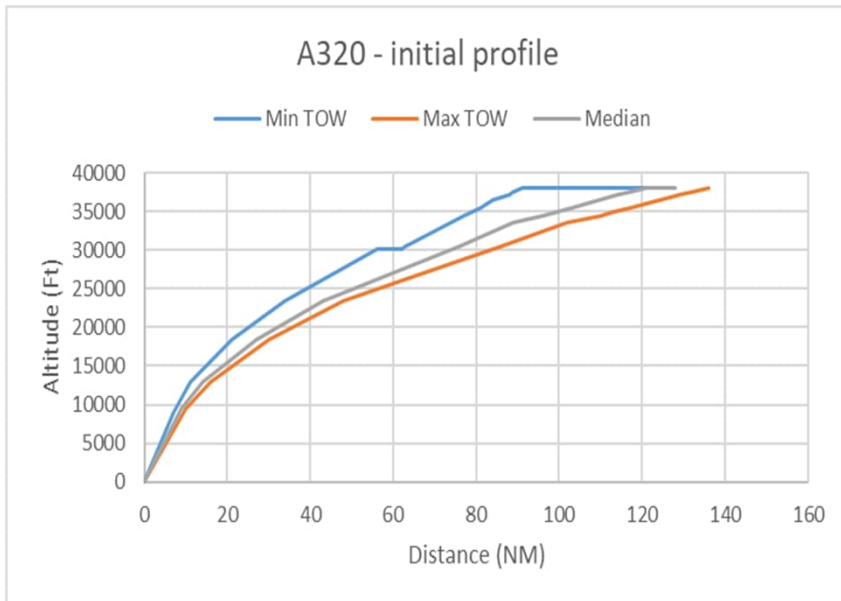
Practical examples – Takeoff weight (TOW) impact on our FDPS

Flights ADEP LOWW, climbing over LKAA

- TOW data for A320, one week from Nov 3, 2025 (78 eFPLs)
- TOW values (kg):
 - MIN – 52394
 - MAX – 68687
 - Median value – 64326

Results:

- ✓ Use of TOW on the vertical profile has positive impact
- ✓ It leads to improved accuracy of system functions (e.g. MTCO)
- ✓ And provides better traffic predictions during the execution phase



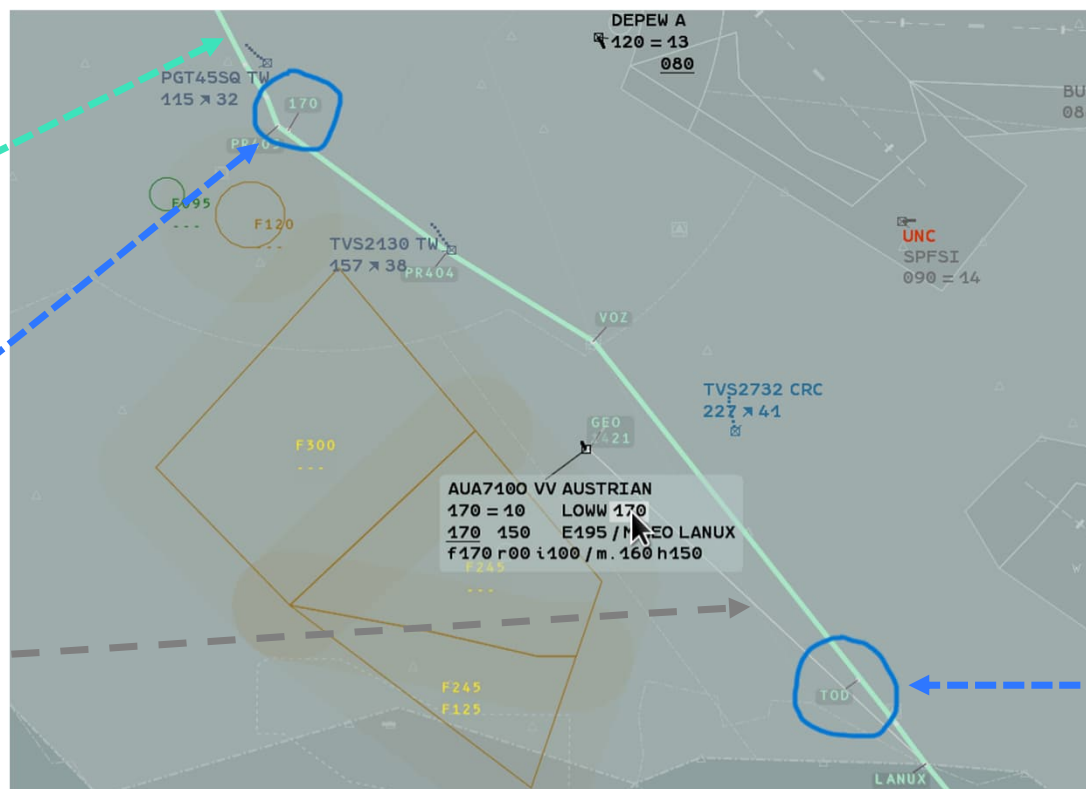
Practical examples – TOC/TOD HMI presentation

Flight LKPR-LOWW

Planned trajectory with TOC/TOD from eFPL can be displayed by ATCOs

TOC is displayed as RFL value

Real trajectory of the flight



Benefits:

- ✓ Supports improved traffic awareness and more effective OPS planning
- ✓ The ATCOs can better estimate when the aircraft will start descending

TOD is displayed as string „TOD“

Lessons learned, conclusions, challenges

- Test and validation against PREOPS started during Spring 2025, detailed operational tests started from Nov 25 (first OPS certificate), results:
 - Completeness of OPS FFICE messages against legacy flight plan messages - correct (nearly 100 percent after Jan 17, after we made last subscription update, small non-blocking problems with DEP events)
 - Issues have been identified within contents of FIXM messages, not consistent with legacy AFTN messages (ICAO od ADEXP format). Communicated with NMOC, workaround was found for all of them
 - Some issues which exist today (hopefully will be fixed in future) and have to be managed manually via FDO – higher load on FDO position
- Data request services need improvement; we will temporarily use AFTN RQP messages.
- Systems have to be able to process both – FFICE and FPL2012 messages, it makes architecture more complicated
- Implementation of new technology – not all our activities were done optimally, also sometimes it was not easy to understand NMOC requirements
- PENS capacity limits => not on the same level as communication via internet, issue mainly for FlightData service
- All findings/issues were communicated with NMOC (B2B and FFICE Teams), thanks them for their support
- Current score of flight plans filed as FFICE eFPL flying over ANS CR airspace increased from 15 to 20 percent during last 3 months:
 - Dec 3:1722 FPLs/50 eFPLs,
 - Jan 3:1977 FPLs/287 eFPLs,
 - Feb 3: 1485 FPLs/294 eFPLs

- **ANS CR in final stage to get ready for operational use of FFICE in Spring 26**

Last, but not least ...

- FF-ICE implementation in ANS CR was **co-funded by the European Union** under the CEF2 Programme, and
- coordinated by the **SESAR Deployment Manager**.



Co-funded by
the European Union



Thank you for your attention!

Any questions?