

NEFAB

north european functional airspace block

Customer Consultation

Oslo, September 07, 2017

Welcome and introduction

Agenda

- ▲ Opening, Welcome and introduction
- ▲ Session 1: General overview
- ▲ Lunch break
- ▲ Session 2 & 3 User experiences and feedback
- ▲ Session 4: Expanding the FRA
- ▲ Closing of meeting

Lunch break will be taken at 13:00-13:45,
coffee breaks between the sessions as convenient

Meeting will close at 16:30

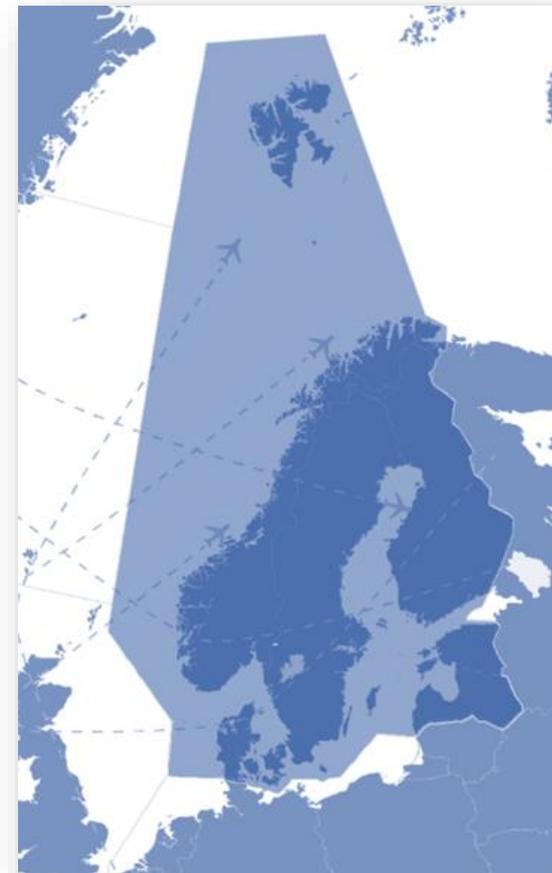


NAVIAR



NEFRA progress in brief

- ▲ **NEFAB FRA and common flight rules with DK/SE FAB** from November 12, 2015
- ▲ **Cross-border FRA between DK/SE FRA and NEFAB EAST FRA** (Estonia, Finland and Latvia) implemented on June 23, 2016
 - Coordination points with Norway retained
- ▲ **Avinor's ATM system** upgrade accomplished in January 2017
- ▲ FRA procedures in **Bodø Oceanic FIR** from March 2, 2017
- ▲ NEFRA Phase 1 completed on May 25, 2017 with **seamless FRA interface** above FL285 across both FABs



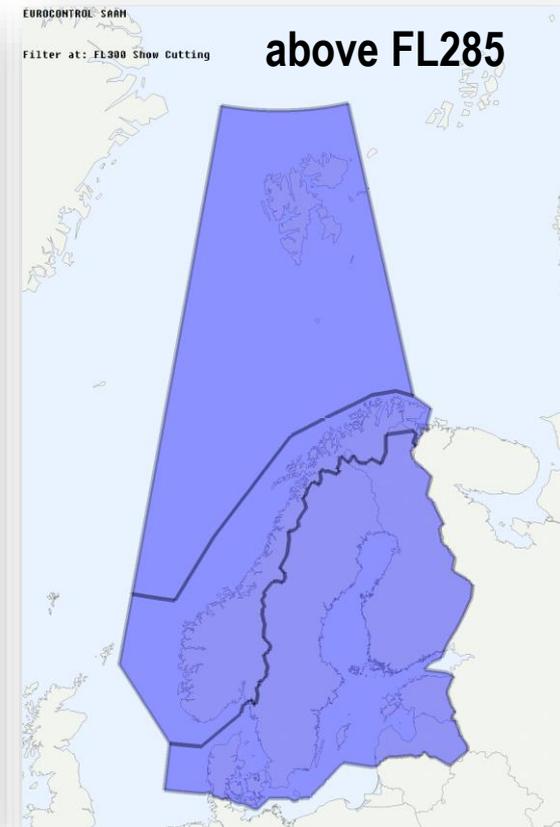
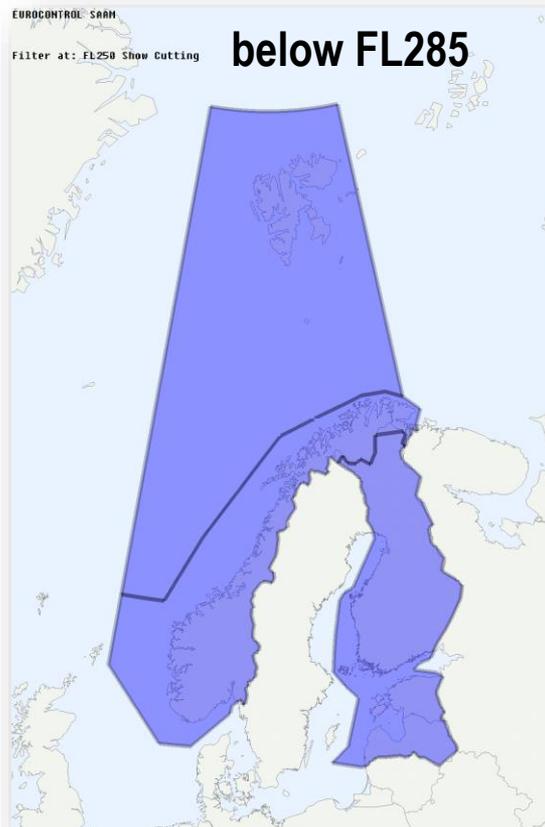
NEFRA, situation before 25 May 2017

below FL285

- NEFAB East FRA cross border FL95+
- NEFAB West FRA FL135+ / FL 195+
- DK/SE DCT

above FL285

- NEFAB East FRA – DK/SE FRA cross border
- NEFAB West FRA



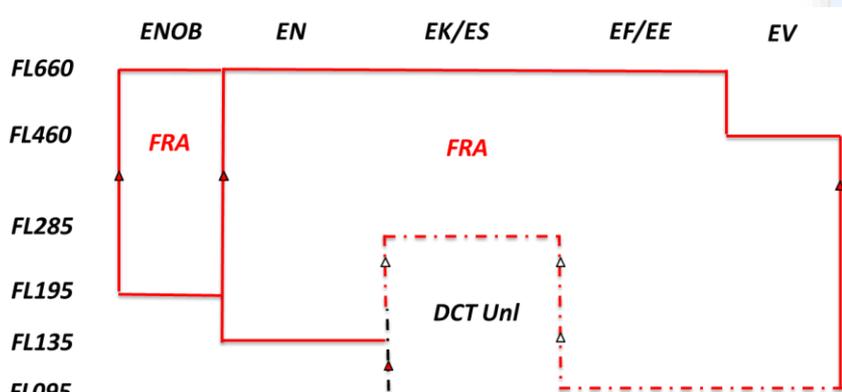
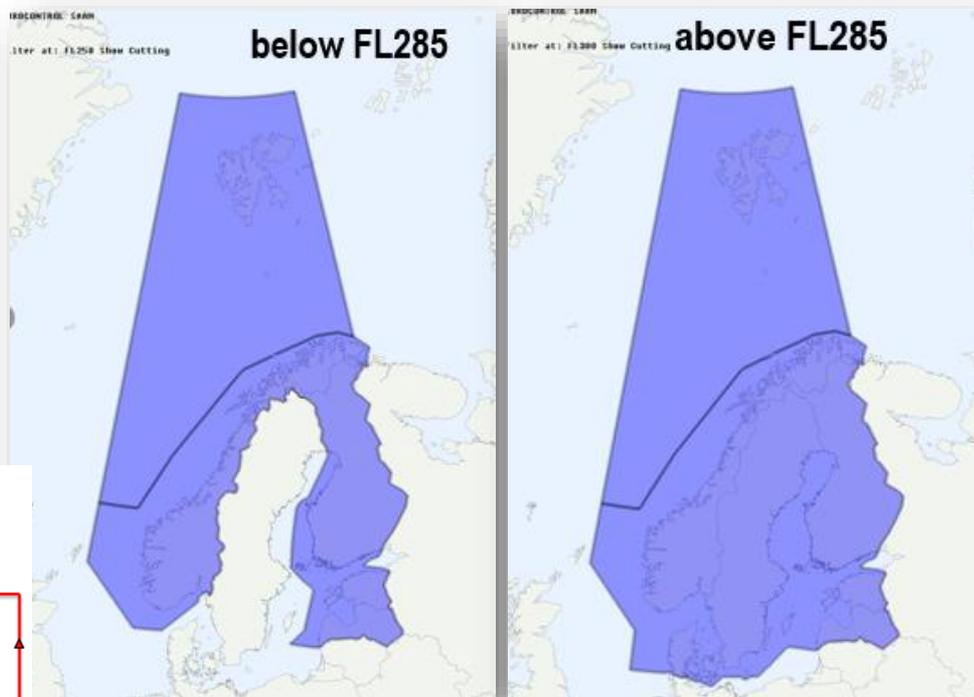
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above FL285

- NEFRA cross border (Bodø OFIR a separate FRA volume)



▲ Mandatory FIR BDRY point

△ Mandatory FIR BDRY point for non-FRA eligible

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Session 1 : General overview **The NEFRA Concept**

NEFRA Concept – brief overview

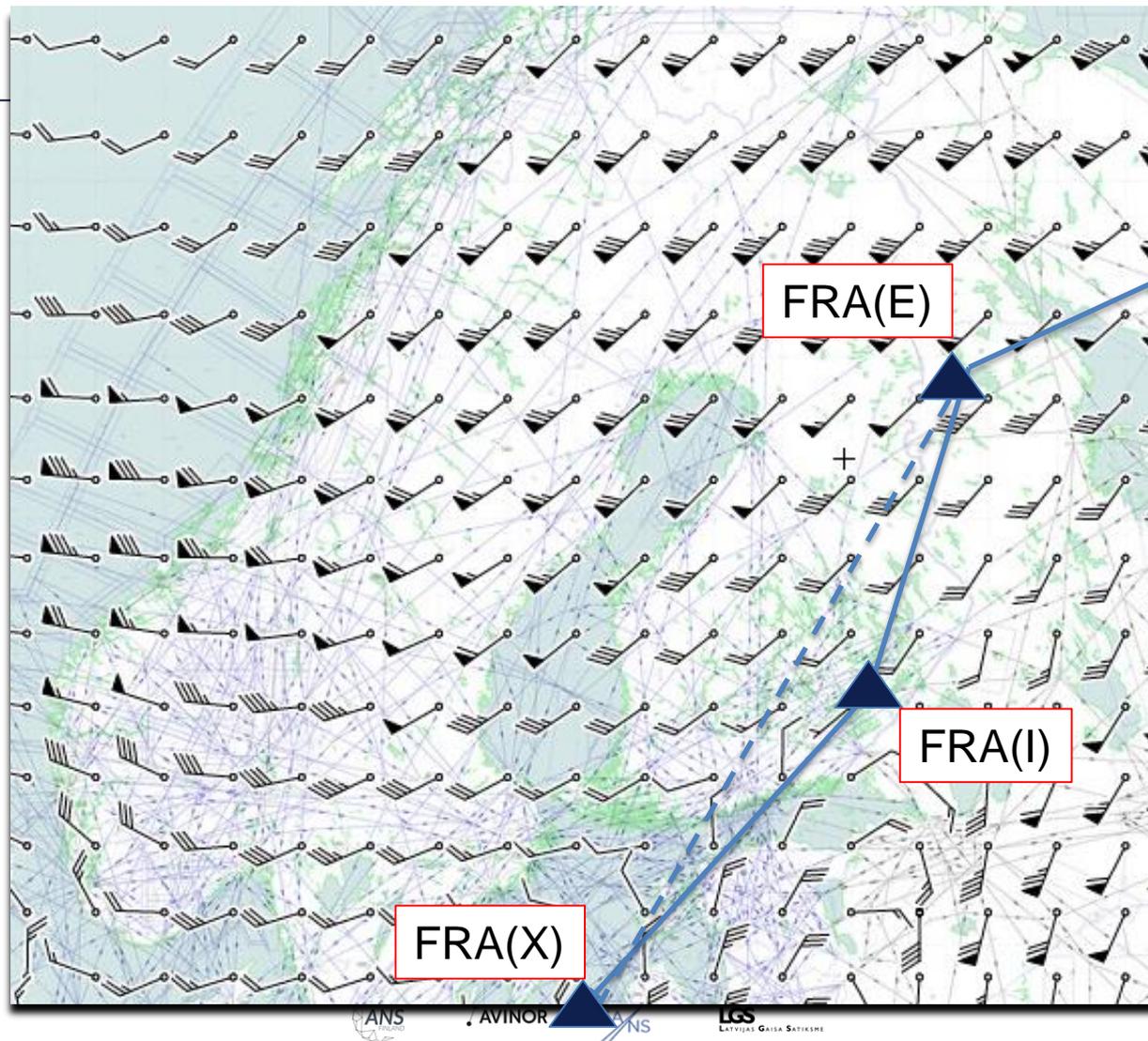
- ▶ **Seamless integration** of two separate FRA volumes (DK/SE FAB - NEFAB)
- ▶ Enable **users preferred trajectories** in a large area regardless of FIR borders
- ▶ **ATS-route network maintained**
- ▶ Users will be able to flight plan their preferred trajectories based on **common NEFRA flight planning rules**
- ▶ **Sectors have been adapted to accommodate the changes in traffic flows** where needed
- ▶ **The military airspace structures re-designed where needed** to accommodate FRA traffic flows and military user requirements.
- ▶ ATM-systems to fulfill basic **NEFRA tech requirements**

Flight Planning in FRA - overflights

Aircraft operators planning their route across NEFRA are provided with Entry and Exit points to/from the FRA, located at the FRA boundary.

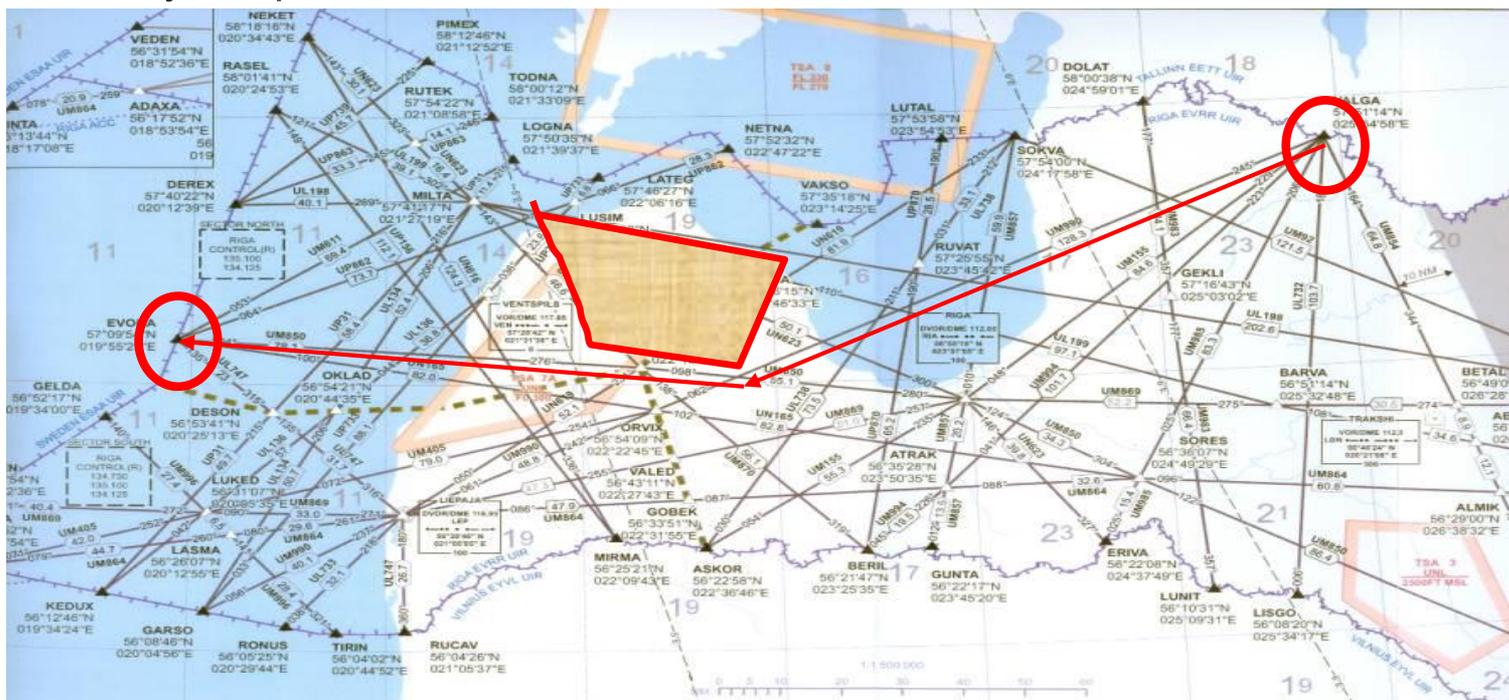
It is now possible to select between shortest distance or inserting intermediate points and taking the benefit from prevailing wind conditions.





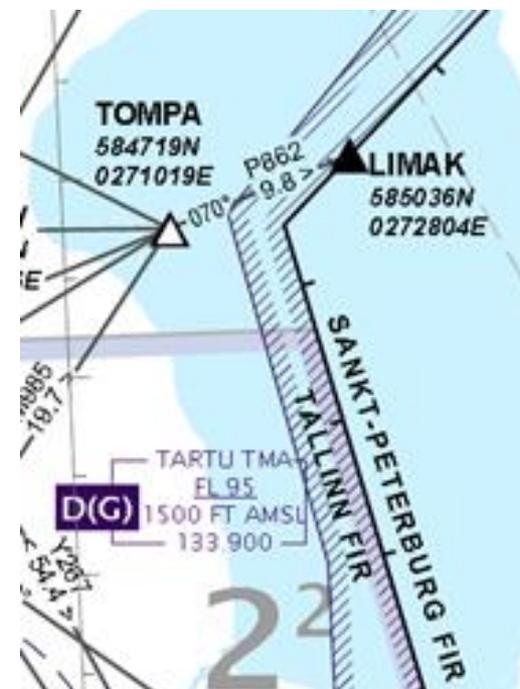
Flexible Use of Airspace (FUA)

- The usage of FUA is always subject to the airspace availability
- Flexible Use of Airspace (FUA) concept ensures co-existence of civil and military airspace users



FRA Entry (E) and Exit (X) points

- ▲ (E) and (X) points are usually at the FIR border
- ▲ In some instances there might be a compulsory ATS route segment from FIR boundary to the (E)/(X) point
- ▲ These mandatory routes are described in national RAD/AIP



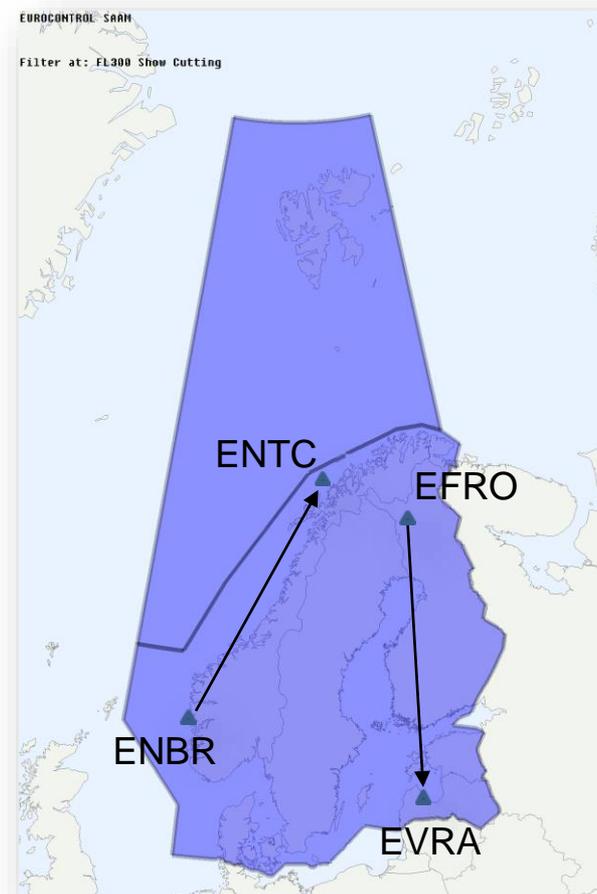
TOMPA	584719N 0271019E	L77 , L734 , L738 , M985 , P862	FRA exit point for flights via LIMAK, FRA exit point
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Flight Planning in FRA – NEFRA domestic

For flights between aerodromes in the NEFRA area the aircraft operators may flight plan freely between Departure point and Arrival point, which are located in the vicinity of aerodromes

Most of these domestic flights would select the shortest route straight from Departure point to an Arrival point

Cross-border DCT – no points at the FIR boundary



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Analysis of potential benefits

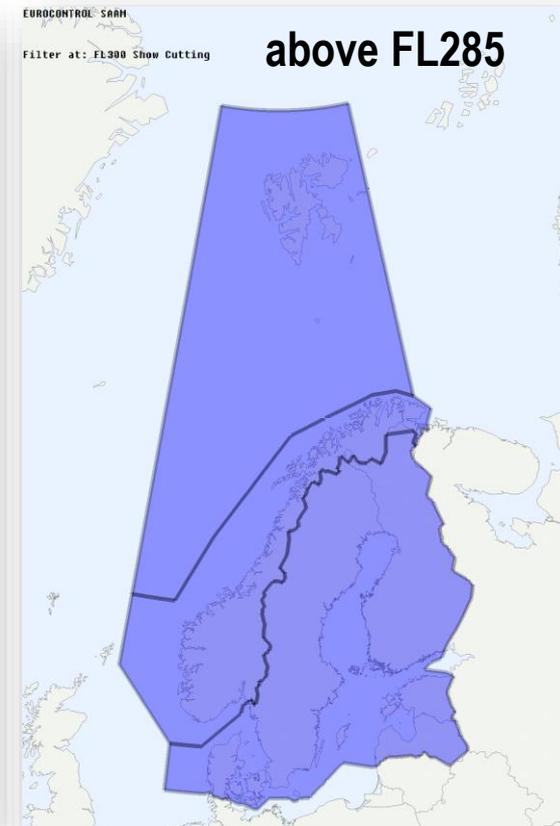
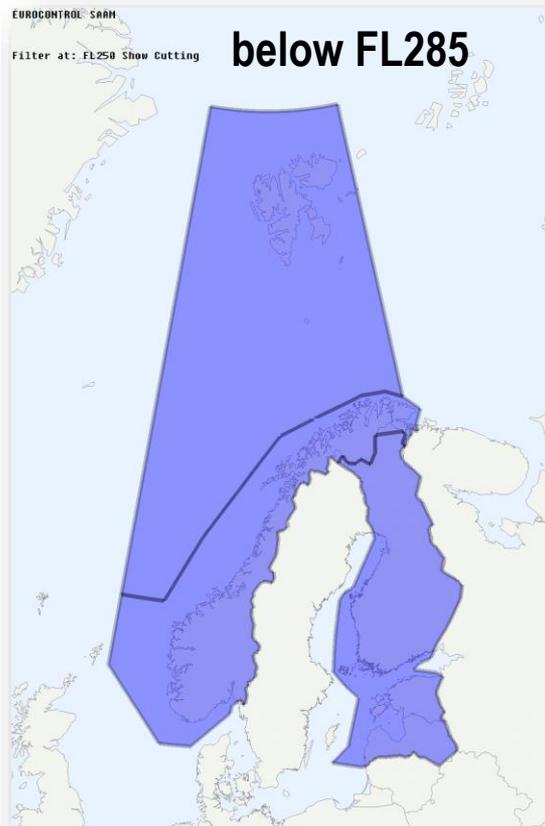
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- NEFAB West FRA



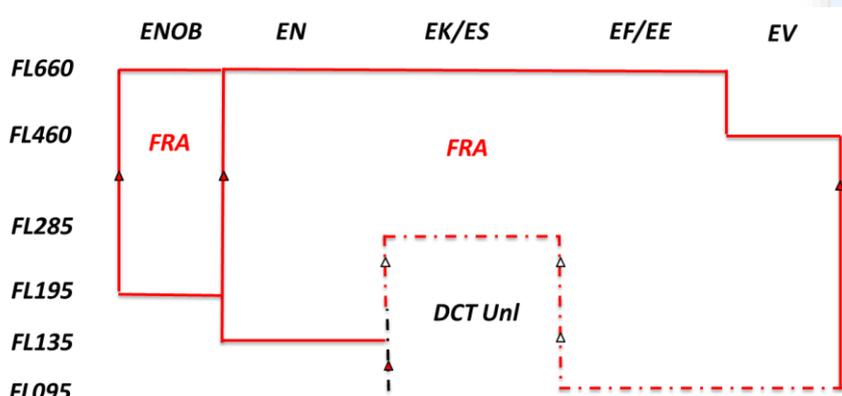
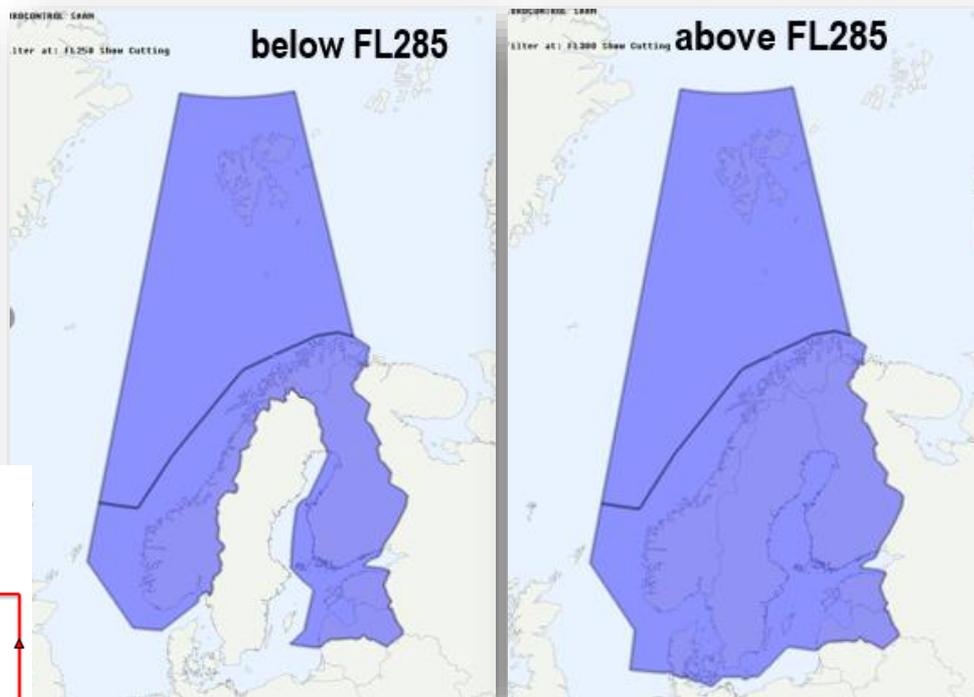
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Analysis of potential benefits

Route Length Analysis compared to European average

DES Well below target, reaching limit

RAD Impact much lower than European average:
+0,5% instead of +1,0%

CDR Impact lower than European average:
+0,3% instead of +0,4%

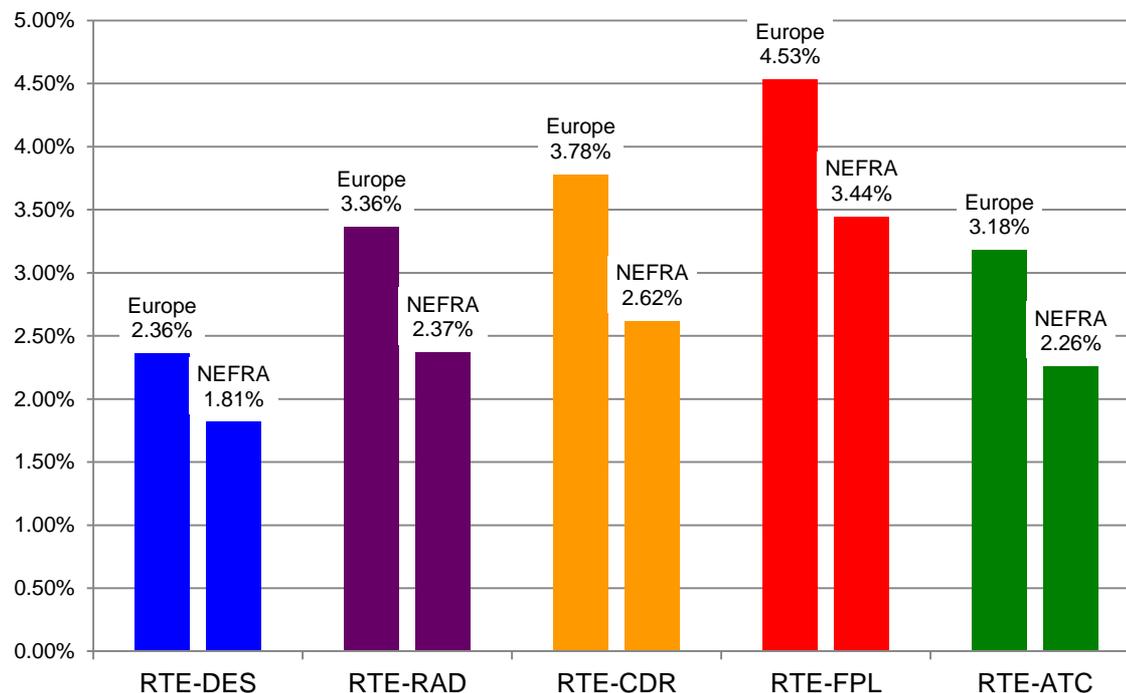
FPL Less efficient compared to European
average: +0,82% compared to 0,75%

ATC Similar route extension improvement by
tactical shortcuts : -1,18% compared to -
1,35%

Room for improvement

Better use of FRA options at planning level

This will improve predictability and reduce ATC
workload



Analysis of potential benefits

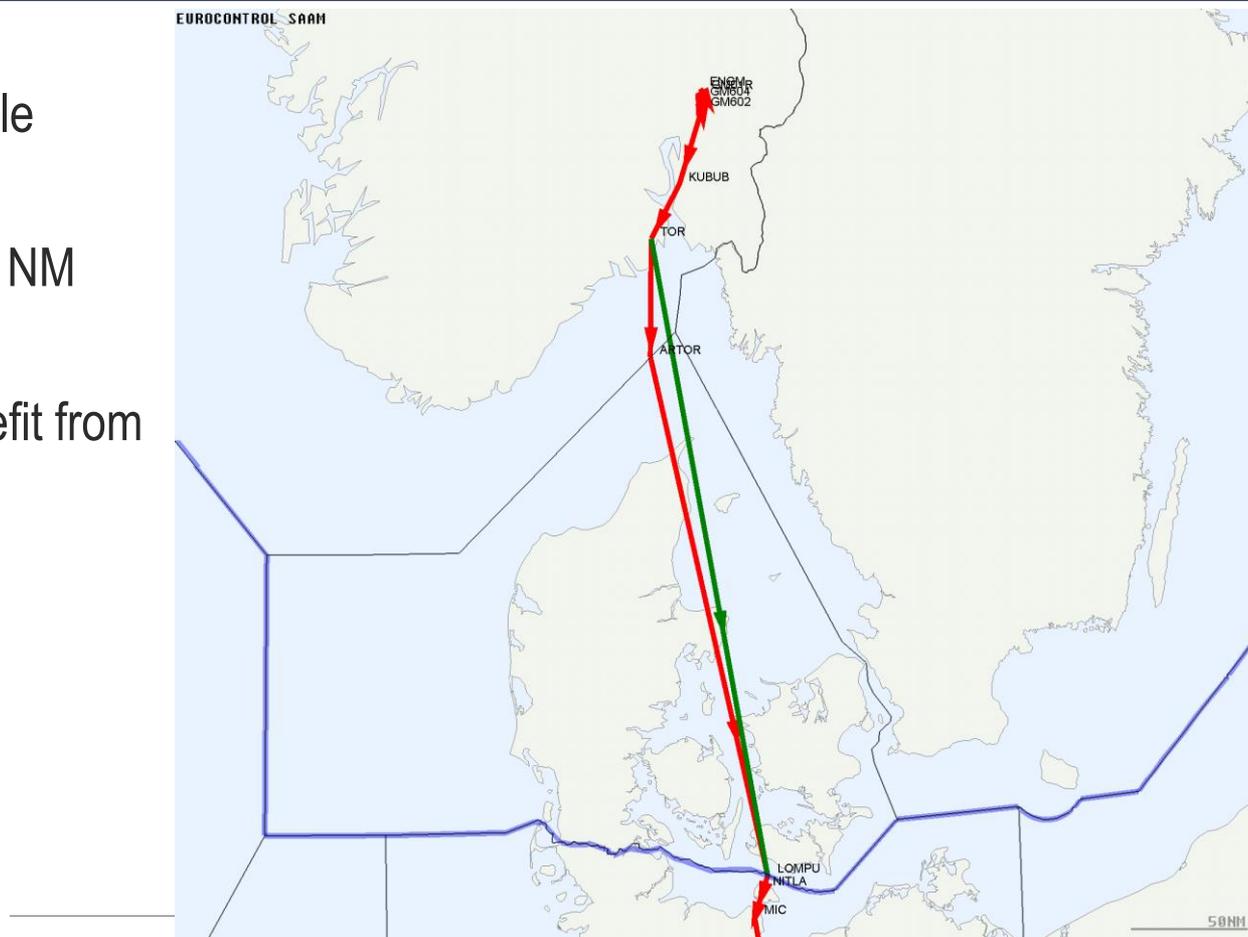
- Detailed analysis of removing the border restriction between NEFAB West FRA and NEFRA
- Potential benefits based on shortest route assignment
- **1 week traffic 26-06 / 02-07 2017**
 - Total number of flights 33536
 - 2425 flights affected / 7,2%
 - Potential saving of 835 NM per week

Total impacted flights	Length (NM)	Time (min)	Fuel (kg)	CO2 (kg)	NOx (kg)
2425	-835	-111	-5789	-18352	-95

Analysis of potential benefits

Potential benefits example

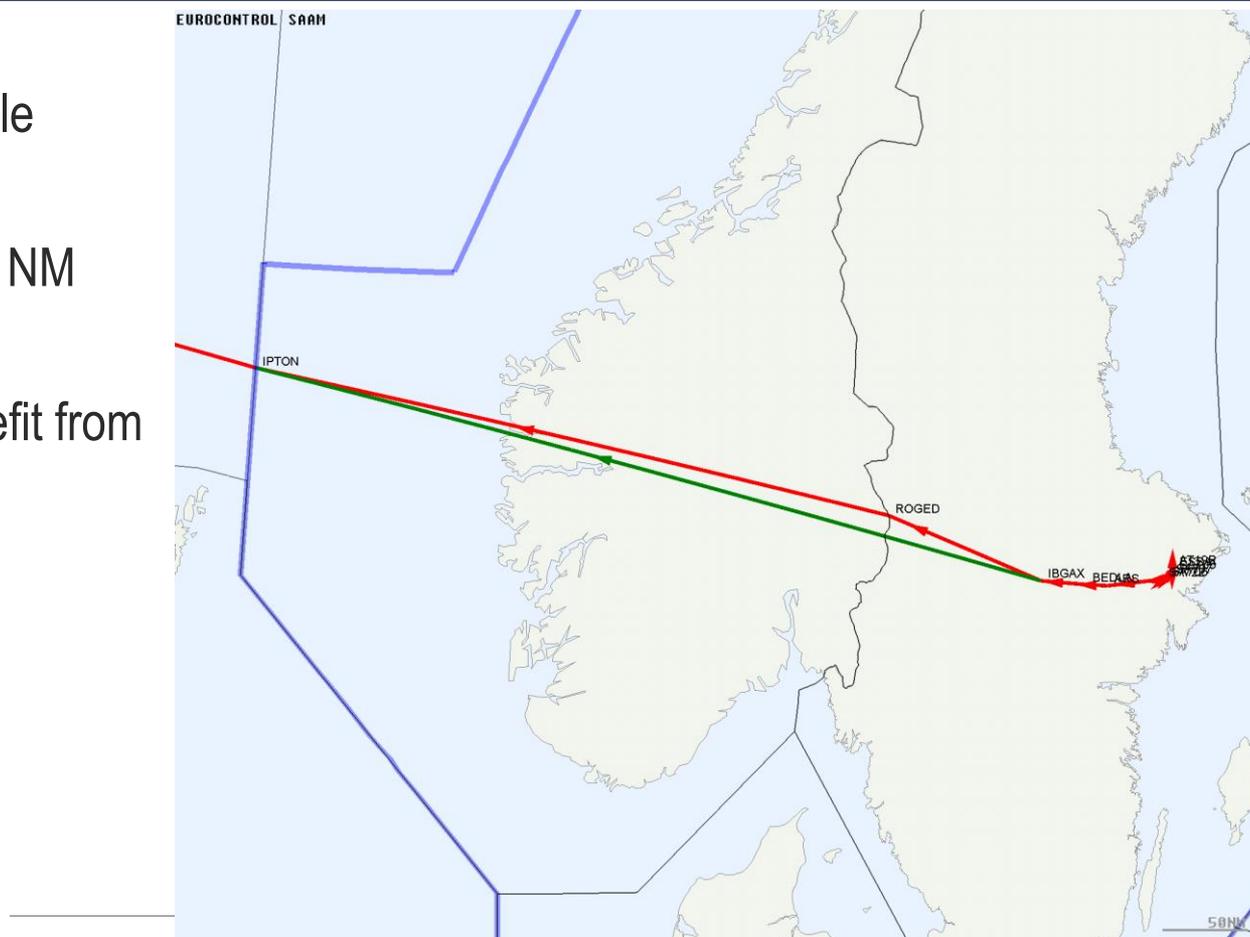
- ENGM EDDM
- Potential Saving 1.08 NM
- 26 flights
- In total 95 flights benefit from this shortcut



Analysis of potential benefits

Potential benefits example

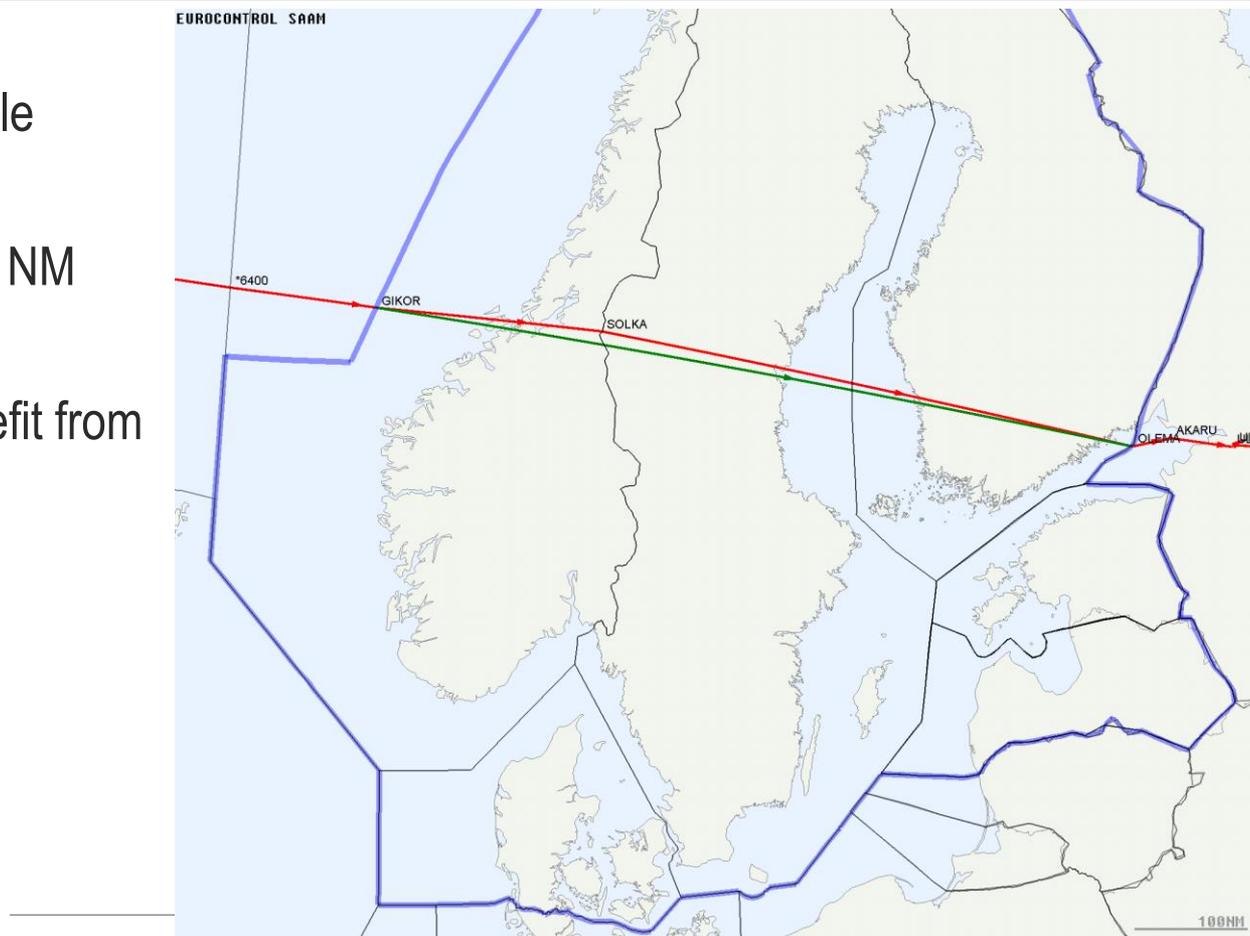
- ESSA KEWR
- Potential Saving 0.97 NM
- 14 flights
- In total 25 flights benefit from this shortcut



Analysis of potential benefits

Potential benefits example

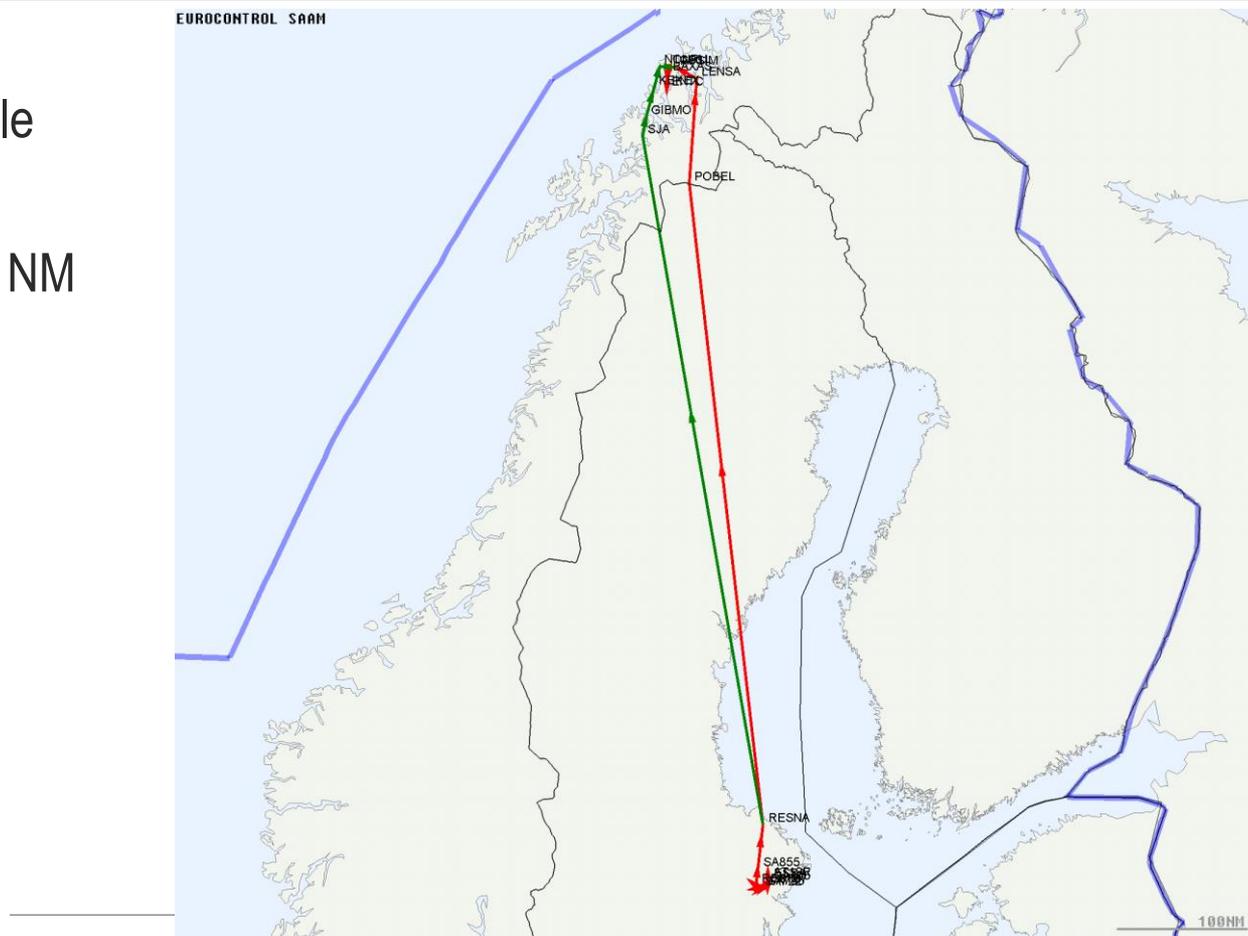
- KJFK UUEE
- Potential Saving 0.45 NM
- 27 flights
- In total 44 flights benefit from this shortcut



Analysis of potential benefits

Potential benefits example

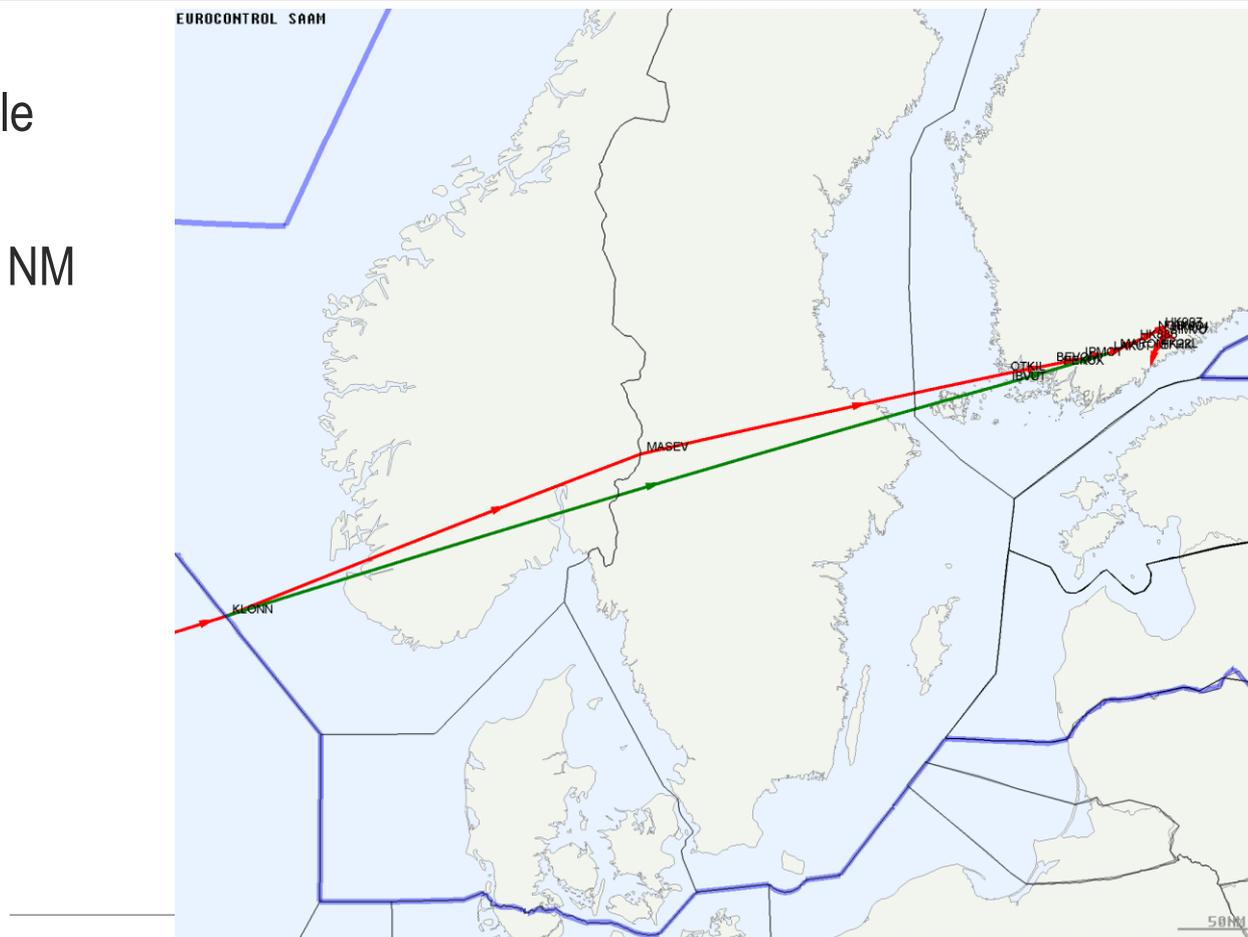
- ESSA ENTC
- Potential Saving 2.16 NM
- 5 flights



Analysis of potential benefits

Potential benefits example

- EGPH EFHK
- Potential Saving 1.60 NM
- 5 flights



Analysis of potential benefits

- Small benefits add up over time; potential saving of 43500 NM per year
- More options available when determining the user preferred trajectory
- Full cross border FRA allows operators to take better advantage of wind, financial aspects, network disruptions
- Better use of FRA options at flight planning level improve predictability and reduce ATC workload



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Analysis of FRA take-up

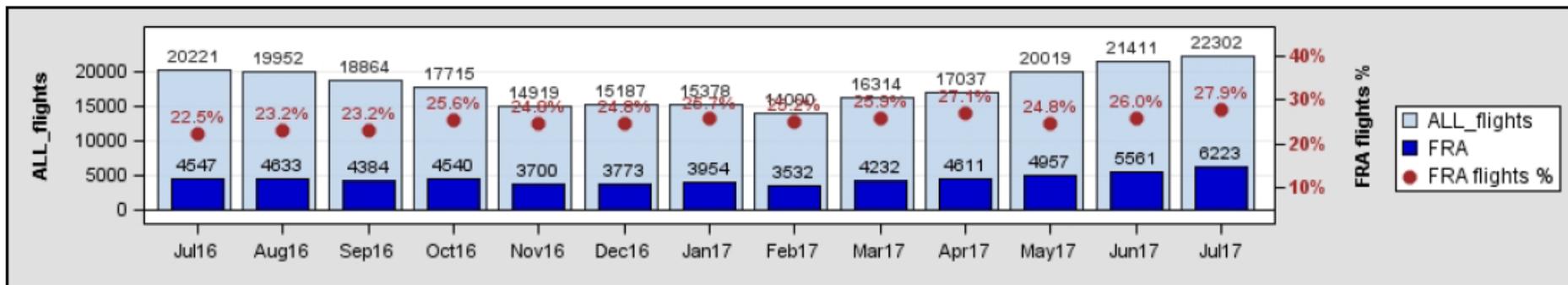
Usage of FRA in NEFRA region

- **Difficult to get a reliable FRA statistics**
 - the flight planning and invoicing systems in use by most ANSPs and EUROCONTROL Network Manager do not allow straightforward differentiation between flights using fixed routes and FRA
 - users are free to select their preferred trajectory, including established fixed routes
 - fixed routes are still available and often the routes coincide with preferred free routing options
- **For various reasons users may not wish to fly FRA**
 - fixed route network in the NEFRA States is already quite efficient
 - short haul flights do not benefit significantly from FRA
 - if a direct routing corresponds with an existing fixed route, the systems generally replace the direct with the route

Usage of FRA in Estonian airspace (1/2)

- Estonian ANS has a measurement methodology due to its independent invoicing system, still available after joining with CRCO
 - % of FRA flights is continuously increasing; from 11% in Nov 2015 to 28% in Jul 2017
 - statistics demonstrate overall trend in the NEFRA area with high credibility

FRA TRAFFIC TREND



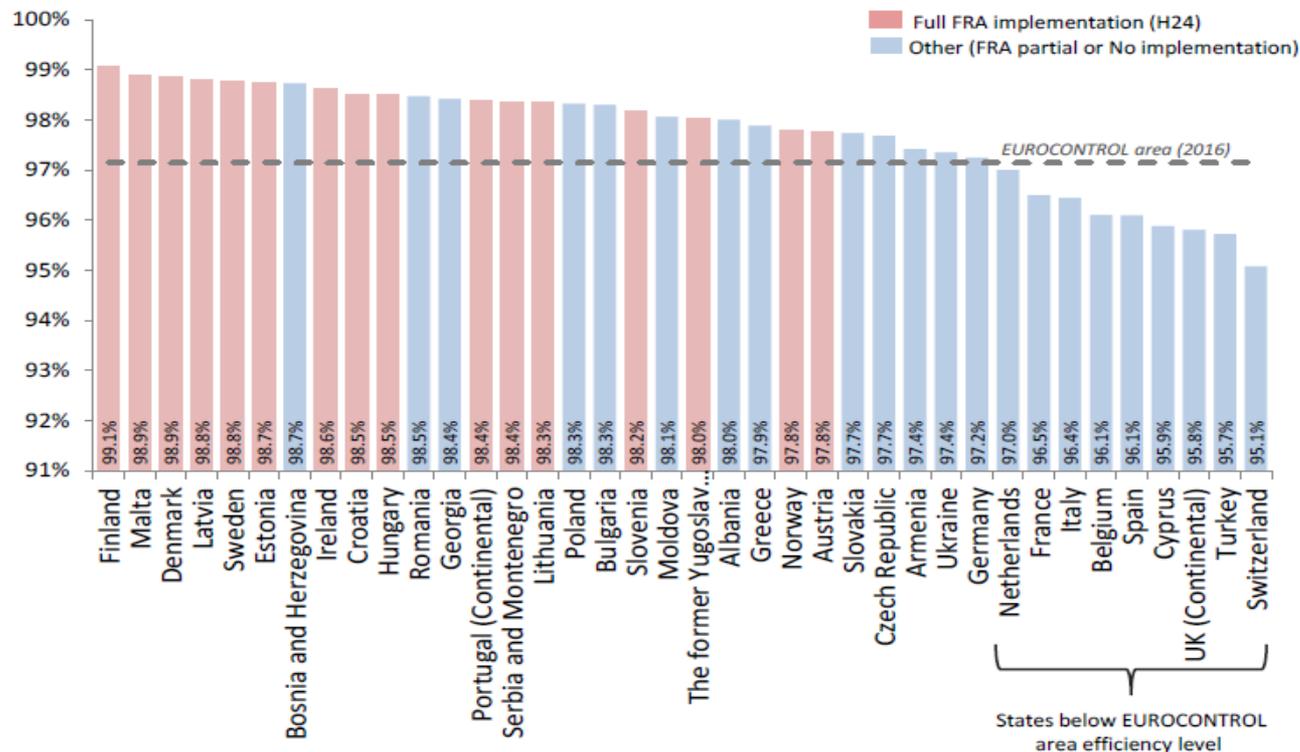
Source: EANS air traffic statistics

Usage of FRA in Estonian airspace (2/2)

FRA FLIGHTS BY OPERATORS		FRA	SHARE in operator's flights	SHARE in ALL flights
FIN	FINNAIR OY	983	23.1%	15.8%
DLH	DEUTSCHE LUFTHANSA AG	749	61.3%	12.0%
BTI	AIR BALTIC CORPORATION JSC	589	46.7%	9.5%
LOT	LOT-POLSKIE LINIE LOTNICZE	464	47.1%	7.5%
QTR	QATAR AIRWAYS	326	70.1%	5.2%
UAE	EMIRATES	233	92.5%	3.7%
KLM	KLM ROYAL DUTCH AIRLINES	231	42.6%	3.7%
AFL	AEROFLOT-RUSSIAN AIRLINES	191	40.8%	3.1%
AAR	ASIANA AIRLINES INC.	166	89.2%	2.7%
BAW	BRITISH AIRWAYS	155	38.2%	2.5%
THY	TÜRK HAVA YOLLARI A.O. (TURKISH AIRLINES)	140	66.0%	2.2%
ETD	ETIHAD AIRWAYS	137	86.7%	2.2%
SWR	SWISS INTERNATIONAL AIR LINES, LTD	135	84.4%	2.2%
AUI	UKRAINE INTERNATIONAL AIRLINES	123	100%	2.0%
MYX	SMARTLYNX AIRLINES ESTONIA	113	66.9%	1.8%
SAS	SCANDINAVIAN AIRLINES SYSTEM	104	23.2%	1.7%
BER	AIR BERLIN PLC & CO.LUFTVERKEHRS KG	95	41.3%	1.5%
JTG	JET TIME A/S	72	81.8%	1.2%
AFR	AIR FRANCE	71	15.5%	1.1%
GEC	LUFTHANSA CARGO AG	67	73.6%	1.1%
AZA	ALITALIA SOCIET? AEREA ITALIANA S.P.A.	63	55.3%	1.0%
OTHERS		1016	12.7%	16.3%

Source:
EANS Air
Traffic
Statistics

Horizontal en-route flight efficiency



Source: Performance Review Report 2016

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Session 2 / 3 : User experiences & feedback

User experiences

- ▲ Using the FRA, opportunities and capability
- ▲ Publication of FRA from users' point of view
- ▲ Airspace availability
- ▲ Airport connectivity
- ▲ Flight planning / flight planning systems, challenges and issues
- ▲ DCT limitation issues
- ▲ Flight planning along AoR boundaries / NM systems
- ▲ Other operational experiences

We are expecting feedback from

- Airline Operators
- Flight Planning Service Providers
- ANSPs
- NM towards operators

FRA in AIP

In line with the European Route Network Improvement Plan
Detailed information on FRA is provided in the AIPs of the participating states

- ▲ ENR 1.3: FRA general procedures and flight planning
- ▲ ENR 2: Areas
- ▲ ENR 3.5: FRA Connecting Routes
- ▲ ENR 4.1 and 4.4: FRA Relevant Points (E) (X) (I)
- ▲ ENR 6: Charts

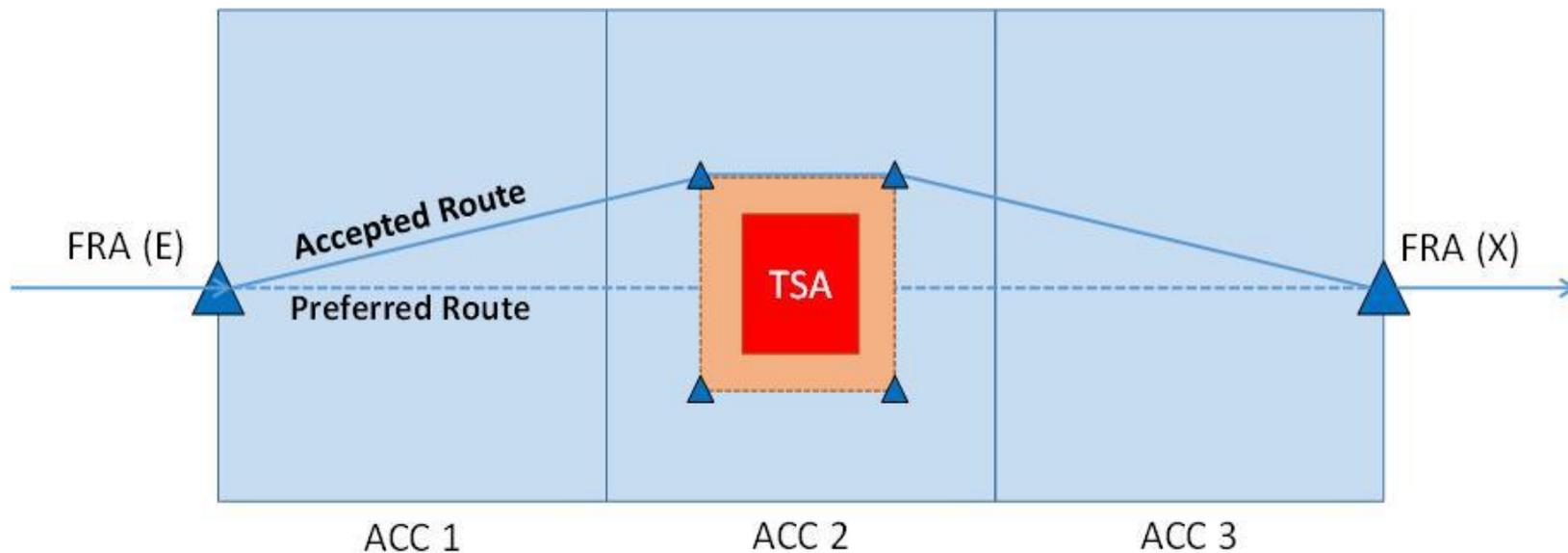
RAD Appendix 5 – Airport connectivity

RAD Appendix 4 – En-route DCT's – General Limits



Airspace Management (ASM)

When a booking is received for an AMC Manageable Area (AMA) the airspace is blocked by IFPS. Any trajectory filed through this airspace will be rejected and a revised flight plan avoiding the area will need to be submitted.



Flight Planning in FRA – Arrivals and Departures

Departures:

- FRA Departure (D) points are defined for each aerodrome in AIP and RAD Appendix 5
- After (D) a DCT is allowed – regardless of flight level
- EFHK and ENGM have mandatory ATS route segments to the (D) points, defined in AIP and RAD appendix 5

Arrivals

- FRA Arrival (A) points are defined for each aerodrome in AIP and RAD Appendix 5
- DCT to (A) is allowed – regardless of flight level
- EFHK and ENGM have mandatory ATS route segments from the (A) points towards the TMA, defined in AIP and RAD appendix 5

FRA Departure Example – Dep EFHK to south

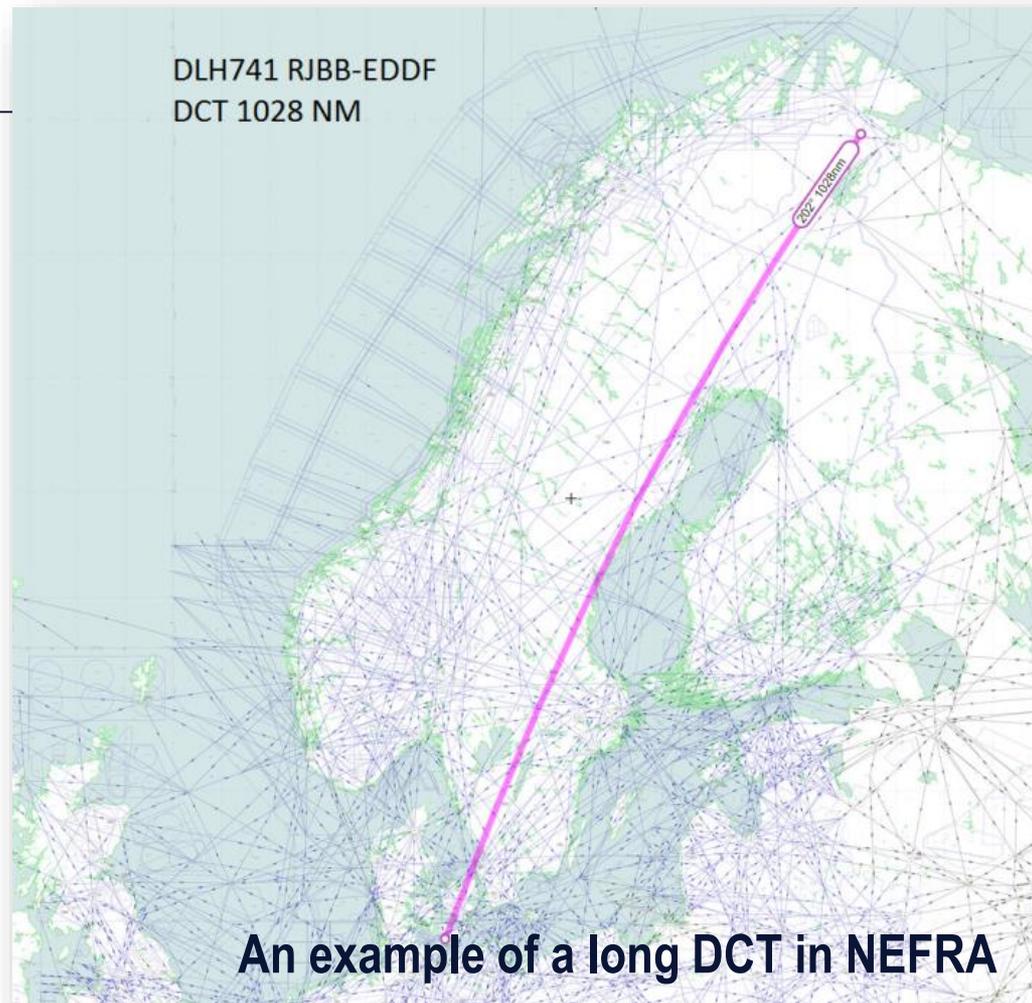
- Departure and Arrival routes are published in that national AIP where the routes reside
- EFHK southbound departures in Estonian AIP



EFHK TMA BDRY waypoint	FRA Departure Transition Point	Flight Plan
DOBAN	DOBAN	DOBAN-DCT
	ROSAX	DOBAN - P739 - ROSAX - DCT (compulsory for traffic crossing EETT-ESAA FIR BDRY)
	TLL	DOBAN - P855 - TLL - DCT (compulsory for traffic crossing EETT-ULLL FIR BDRY)

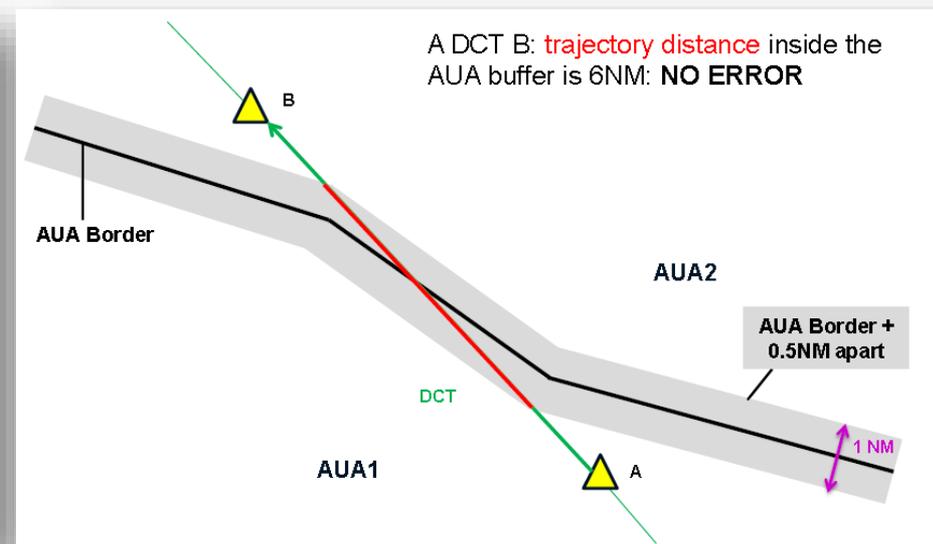
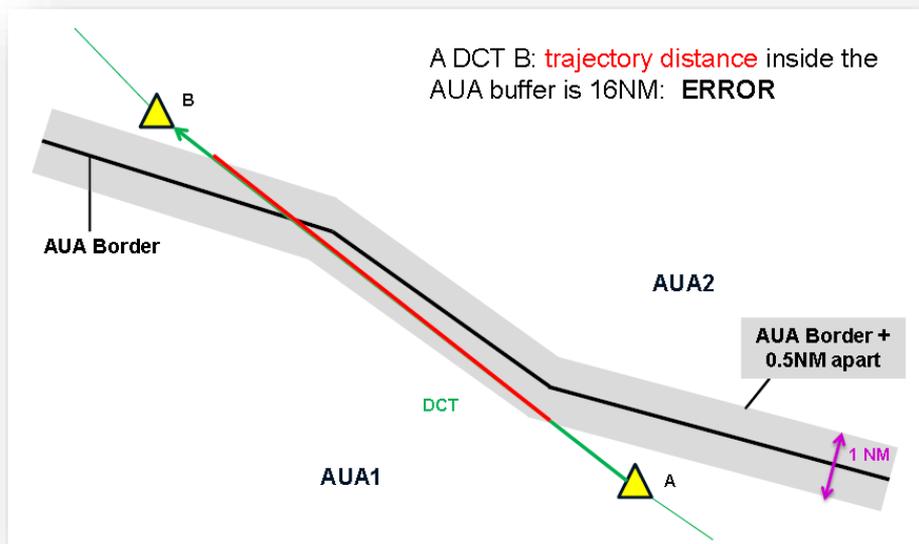
Maximum DCT length

- No DCT length limitation in NEFRA
- Discussion ongoing at RNDSG regarding setting a maximum DCT length in FRA
- This means there would be one set value that would need to be used in all countries of the network



Flight planning along AoR boundaries

NM will reject flight plans 'along' the borders, even within the FRA



Picture base: EUROCONTROL FRA Application NMOC – Guidelines v1.1

ATM system requirements

- The following systems support is deemed as basic requirements to accommodate NEFRA operations:
 - The ATM systems have to be able accept and process the NEFRA flight plans.*
 - NEFRA ACC`s shall be able to process and coordinate flights via OLDI. This coordination shall be based on the point where the planned DCT crosses the ACC boundary.

** This also means that the individual ATM-system must be capable of handling all FRA relevant points in NEFRA.*

Need of ATS route network in FRA

- Fixed ATS route network has been removed in some of the FRA implementations and is planned to be removed in coming FRA implementations (e.g. UK)
- Removal of the ATS route network is under consideration in NEFAB
- ***What is your opinion and what impact, if any, it would have on your operations if the ATS route network would be removed in NEFRA?***

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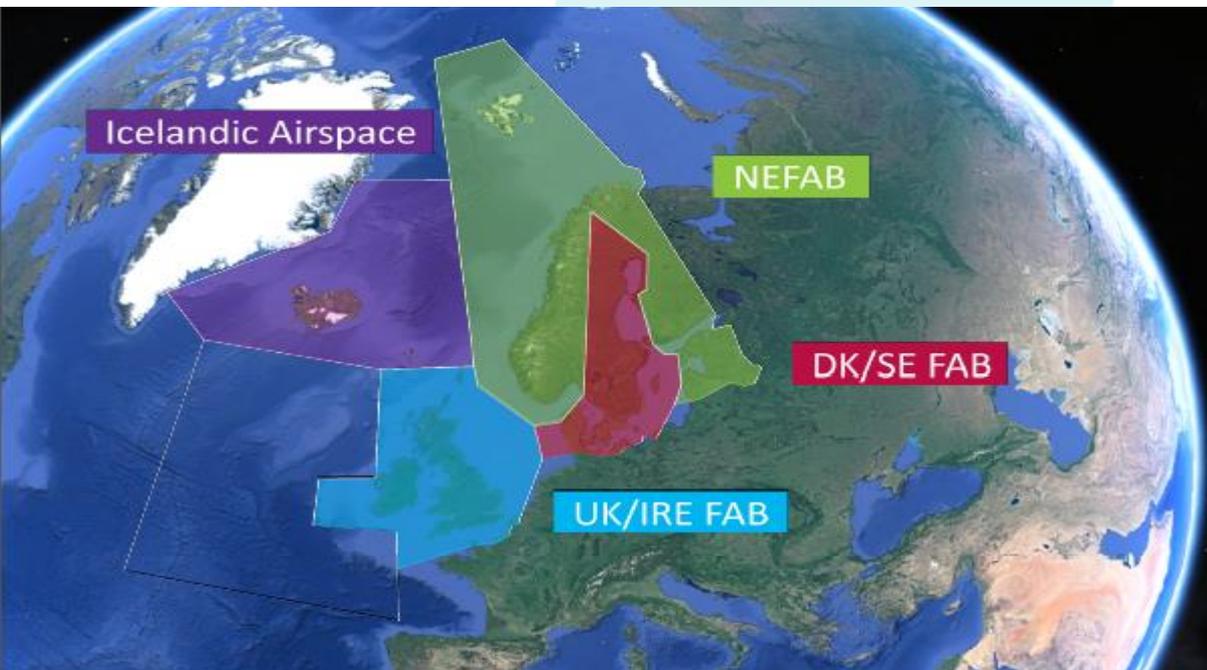
Session 4 : Expanding the FRA



***Borealis Alliance FRA Programme
~ NEFRA Customer Day ~***

Pontus Bengtsson

Overview of the Borealis Alliance



- 9 ANSPs
- 3 FABs
- > 4M flights/year
- > 11000 flights/day
- > 39% of European traffic



Activities of Borealis Alliance

Tier 1	Key strategic projects relevant to the <u>whole Alliance</u>	Free Route Airspace
Tier 2	Opportunities to collaborate between <u>few ANSPs</u>, potential future Tier 1 projects	Time Based Separation
Activity	Idea for collaboration raised by anyone (Board, ARs, AEM, experts)	e.g. VoIP

Free Route Airspace

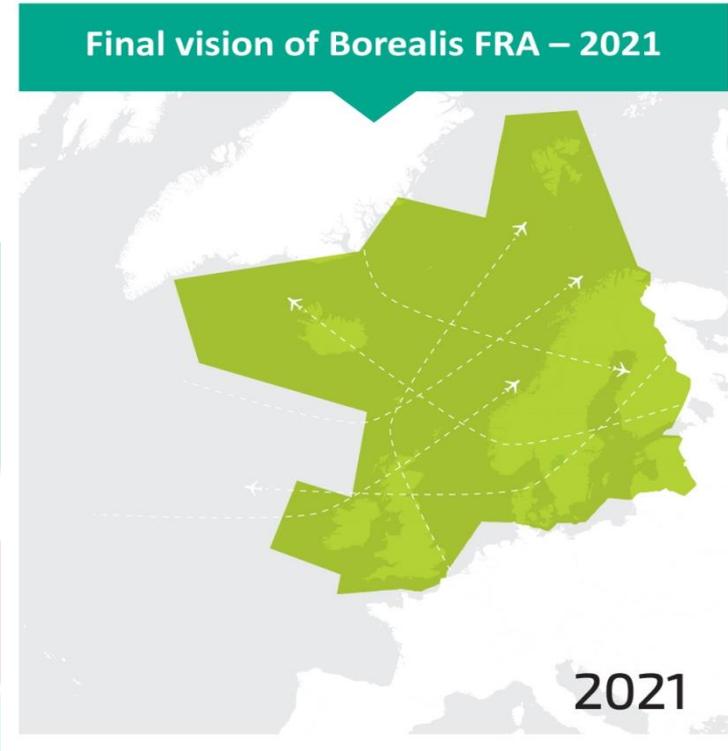
borealis
ALLIANCE

Free Route Airspace Programme

- *Commenced on 1st January 2015 and is expected to run until 2021, when the vision will be realised*
- *Building on the implementations of FRA by DK/SE FAB, Ireland and NEFAB*
- *The scope of the Borealis FRA programme crosses regions (EUR and NAT), FABs, and national airspaces*
- *Free Route Airspace is key to the delivery of fuel efficient and environmentally friendly user preferred routings from the eastern boundary of the North Atlantic to the western boundary of Russian airspace in the North of Europe*
- *Our aim is to enable airspace users to fly efficient routes which can be planned for in advance, allowing savings such as reduced fuel load to be realised*
- *For more information please see <http://www.borealis.aero>*

Free Route Airspace Programme

Lead ANSP	Step	Planned
IAA	Extension of FRA in Shannon FIR down to FL75	2017
Isavia	FRA for all flights transiting via Norway and Scottish FIRs	2018
NATS	Implementation of FRA in seven Scottish FIR sectors	2020
NATS	Full implementation of FRA in Scottish FIR and in parts of London FIR	2020
NATS	Full implementation of FRA in London FIR	2021



ESTIMATED* ANNUAL BENEFIT FROM BOREALIS FRA FROM 2022 ONWARDS



Seamless airspace
7M Nm
>1M min



Cost savings
€60M



Reduced fuel burn
46K t



Less emissions
146K t CO₂
641 t NO_x

* based on the EUROCONTROL NM model of shortest routes

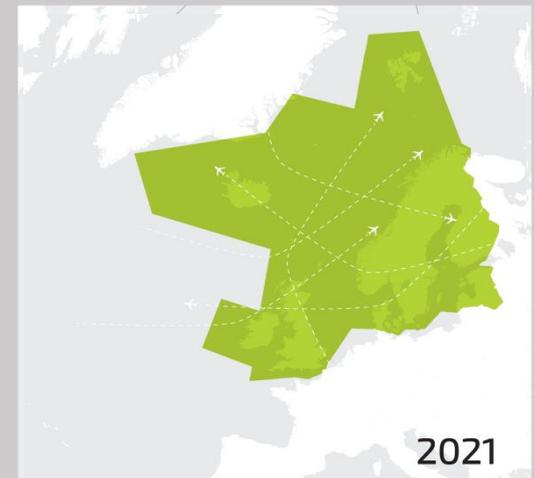
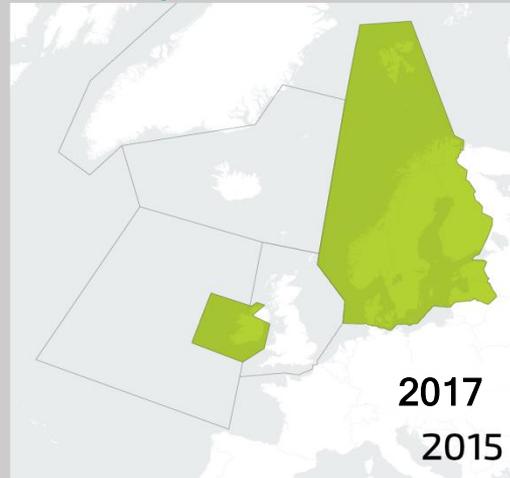
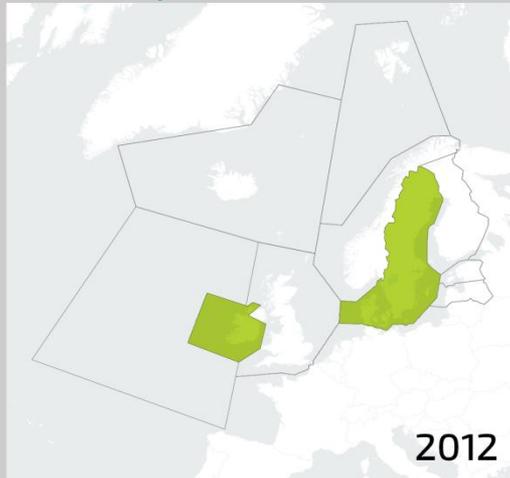
Free Route Airspace Programme

INCREMENTAL STEPS TO JOIN EXISTING FRA

Irish and
Danish/Swedish FAB

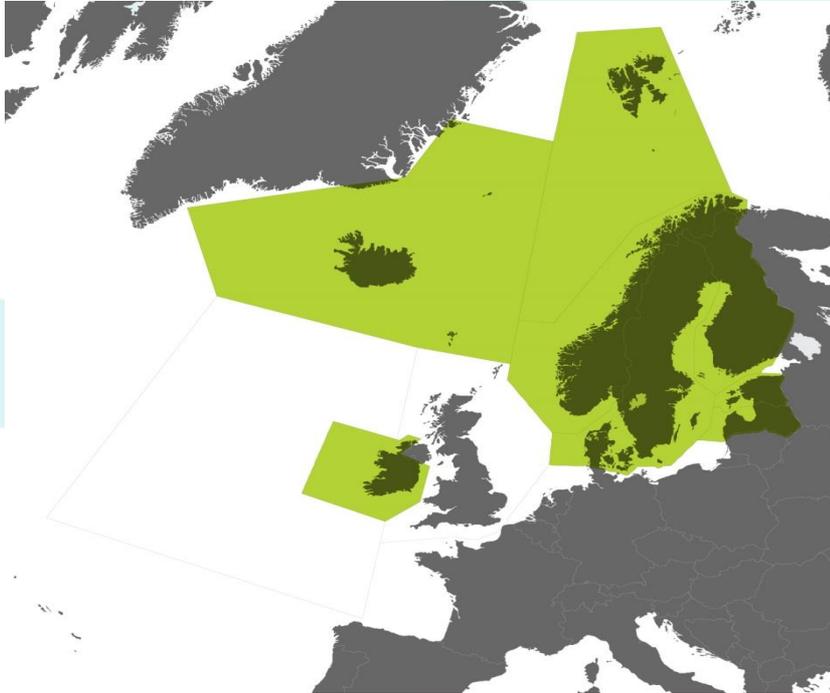
NEFAB live 2015
NEFRA finalized 2017

Icelandic and UK
airspace joining from
2016 onwards

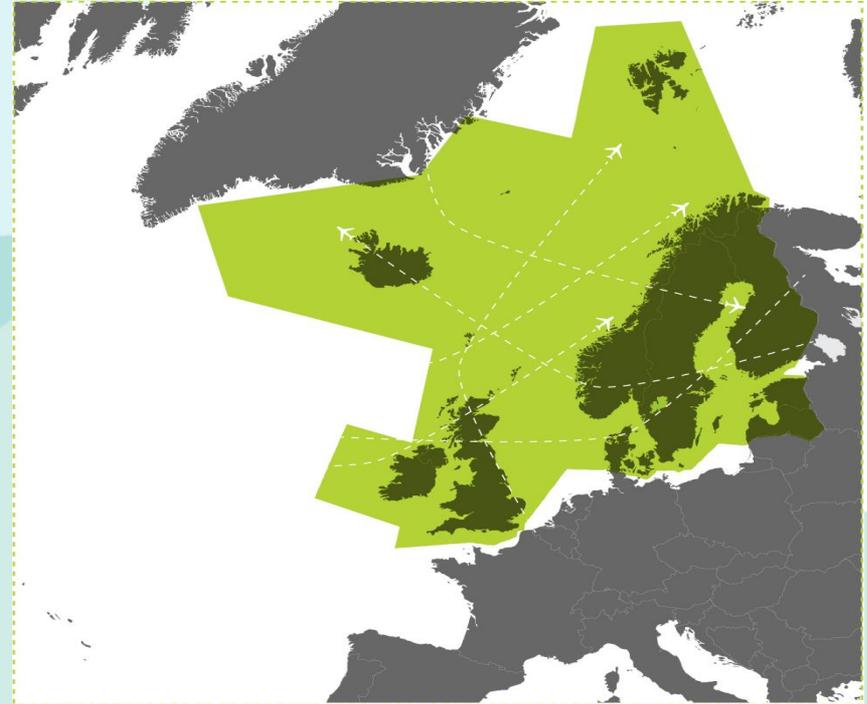


Free Route Airspace Programme

PRESENT STATUS OF BOREALIS FRA



FINAL VISION OF BOREALIS FRA - 2021



For more information

Please visit Borealis website www.borealis.aero and <https://www.linkedin.com/company/borealis-alliance>

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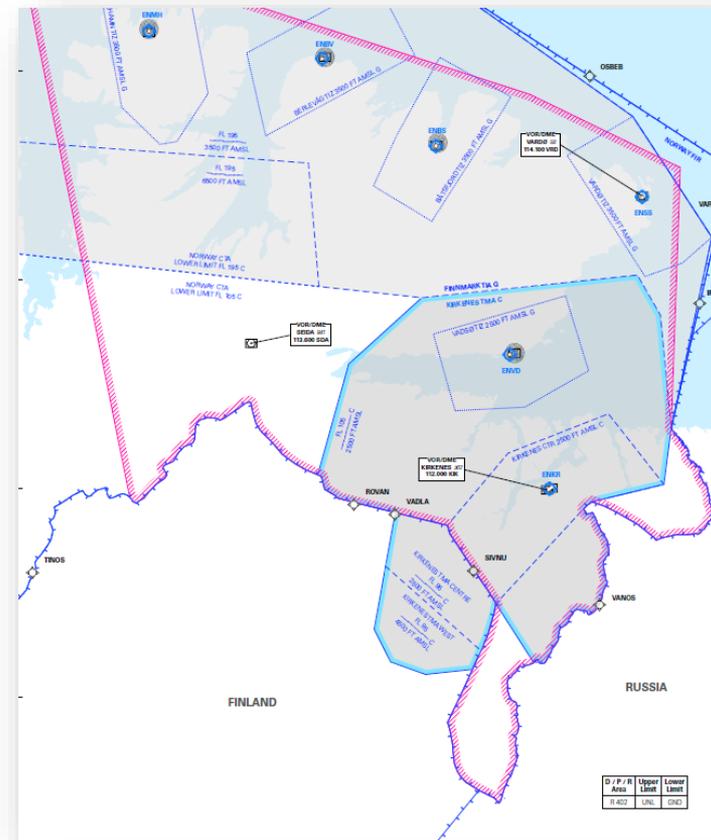
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Cross-border developments

Cross-border developments

- **Kirkenes cross-border TMA** from November 10, 2016
 - cross border Air Traffic Services across the border of Finland and Norway, where Kirkenes Tower/Approach is providing the services in parts of Finnish Airspace
 - facilitated operations to/from Kirkenes Airport
 - boosted cross border cooperation between ATCOs in both ANSPs



Cross-border developments

- **FINEST project of cross-border ATC** between EANS and ANS Finland is ongoing, currently on table:
 - mapping the technical system capabilities
 - identifying the needs for OPS and SMS harmonisation
 - developing the ConOps and Programme Management Plan

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Wrap up and conclusions

Thank you for the attention

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