EGNOS@DFS

Satellite-Based Augmentation for Germany

EGNOS 2025 Workshop, Berlin, Germany

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Head of Navigation Services

DFS Deutsche Flugsicherung

German Air Navigation Service Provider DFS

DFS at a Glance

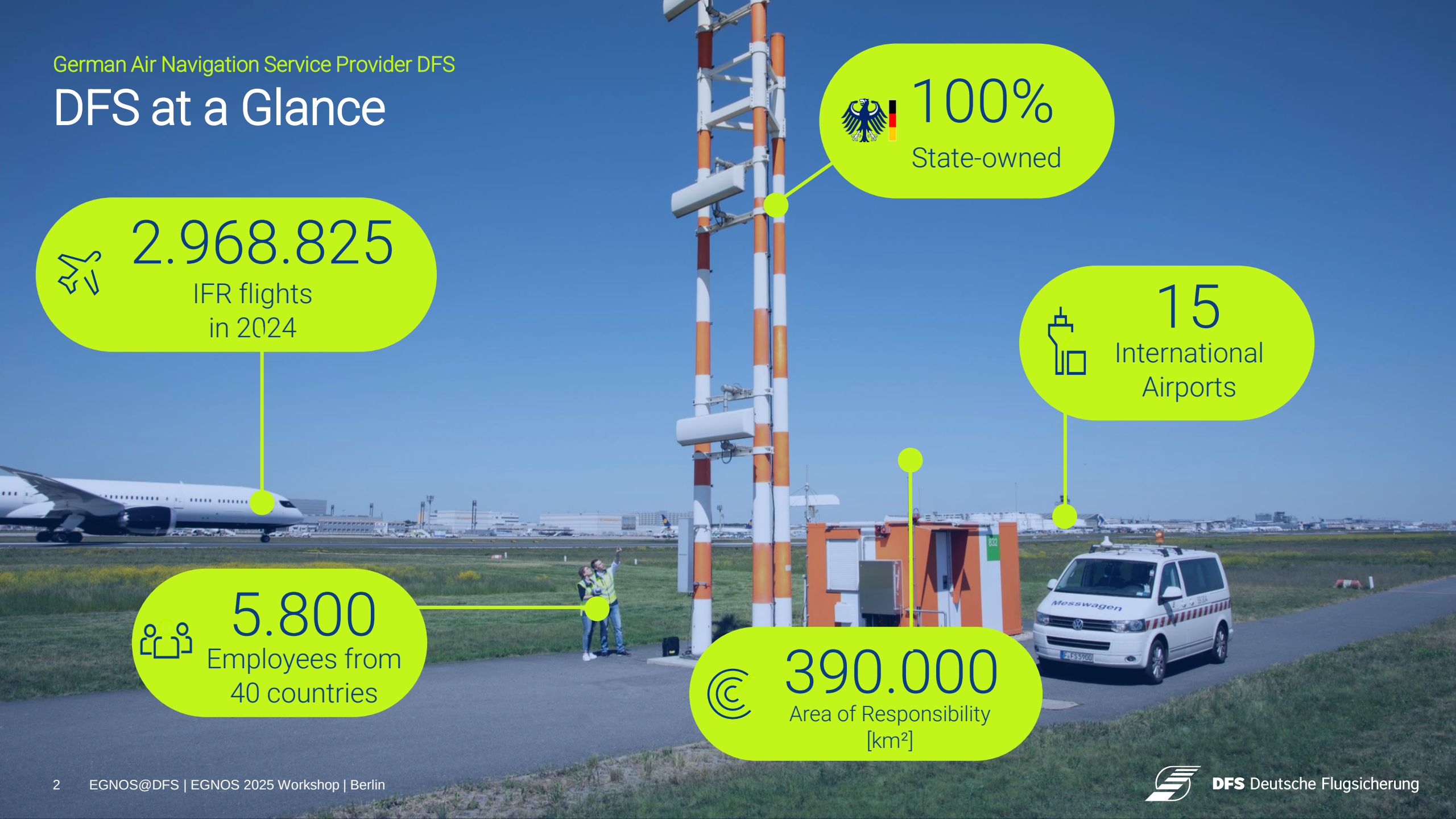
100%
State-owned

2.968.825
IFR flights
in 2024

15
International
Airports

5.800
Employees from
40 countries

390.000
Area of Responsibility
[km²]



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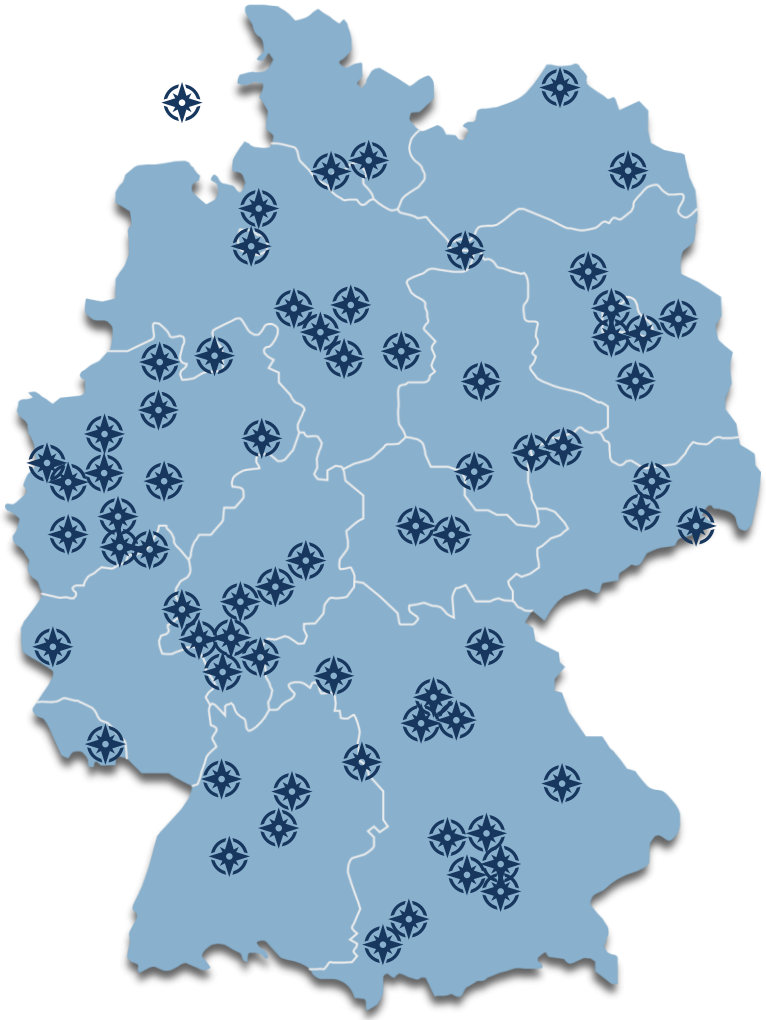
DFS‘s Navigation Infrastructure

Current Status



Enroute Navigation / Non Precision Approach

- 48 (D)VOR
- 67 DME (21 stand-alone)
- 19 NDB
- 2 TACAN
- 6 VHF Direction Finder

Precision Approach

- 15 Sites (Airports)
  with in total
- 45 Instrument Landing Systems (GE total: 82),
  - 34 ILS CAT II/III
  - 11 ILS CAT I
- 1 GBAS CAT II

Satellite-based Procedures

- Published at 60 German aerodromes

A Look into History

2003 (up to now)	**Hosting and Maintenance of RIMS Berlin**
2008	**From the very beginning DFS is a shareholder of ESSP**
	Hosting and Maintenance of one Central Processing Facility (CPF) at Langen (until DEC 2021)
MAR 2011	**European Commission approves EGNOS Safety of Life (SoL) Services**
DEC 2011	**Approval of EGNOS in German airspace**
2012	**First 3D APV SBAS approach available**
2017	**First 3D APV SBAS CAT I approach available (Bremen airport)**
since 2018	**PBN implementation**

esa EGNOS

European Geostationary Navigation Overlay Service

NACHRICHTEN FÜR LUFTFAHRER

59. JAHRGANG LANGEN, 15. DEZEMBER 2011 NfL I 209 / 11

Bekanntmachung über die Nutzung von EGNOS auf RNAV(GPS)-Anflugverfahren

Hiermit wird die Nutzung des europäischen Satellitenergänzungssystems (SBAS) „EGNOS" für den Betrieb auf den in der AIP Abschnitt AD publizierten RNAV(GPS)-Anflugverfahren, sowohl für Nichtpräzisionsanflüge (NPA bis zum publizierten „LNAV"-Minimum) als auch für APVVerfahren (APV baro-VNAV bis zum publizierten „LNAV/VNAV"-Minimum, APV-SBAS bis zum publizierten „LPV"-Minimum) freigegeben.

Voraussetzung zur Nutzung der Vertikalführung mit EGNOS auf APV baro-VNAV-Verfahren ist eine zugelassene SBAS-Avionik der Klasse 2, 3 oder 4.

Informationen zur Systemverfügbarkeit von EGNOS werden im Falle einer negativen Verfügbarkeit über NOTAMs publiziert. Ansonsten ist davon auszugehen, dass das System EGNOS betriebsbereit ist.

Weitere operationelle Nutzungsvoraussetzungen sind über entsprechende EASA-Publikationen geregelt.

Langen, den 23.11.2011
Bundesaufsichtsamt für Flugsicherung
BAF LFR/2.10.1/0024-001/11

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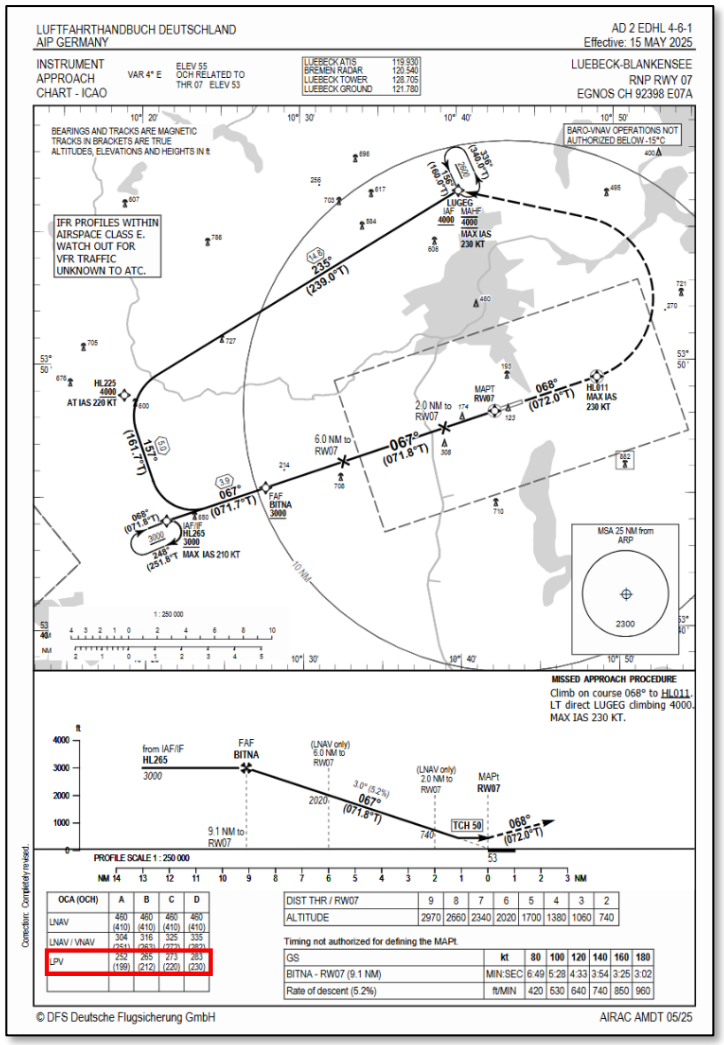
EGNOS SoL-Services in Flight Procedure Design & OPS



- **> 20 years experience in LNAV/VNAV(GPS)-Procedures since the first deployment of Baro-aided procedures in Germany**
- **No incident reported concerning Baro-aided LNAV/VNAV(GPS)- or LNAV/VNAV(EGNOS)-Procedures in Germany since 1998 resp. 2012**
- **Flight validation and flight inspection of LNAV/VNAV(EGNOS)-Procedures during the implementation phase**
- **Main focus is on regional airfields to allow for rationalization of terrestrial NAV-infrastructure for NPA (mainly NDB decommissioning) adressing Business and General Aviation**

Until now, operational use of EGNOS-based procedures in Germany mainly by Business and General Aviation

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PBN Implementation Milestones

Based on Implementing Regulation 2018/1048

RNP APCH or RNP AR to all IREs without PA,
(except at those airports listed in point 1.2.1 of the Annex to the PCP Regulation , and, where required, RF legs)
RNAV 5 for all ATS routes at or above FL150

until
03.12.2020

until
25.01.2024

RNP APCH or RNP AR to all IREs, and, where required, RF legs

For all IREs, **RNAV 1 or RNP 1(+) for at least one established SID/STAR**

For all IREs, **RNP 0.3 or RNP 1 or RNAV 1 for at least one established SID/STAR for rotorcraft operations**

RNAV 5 for ATS routes established below FL150

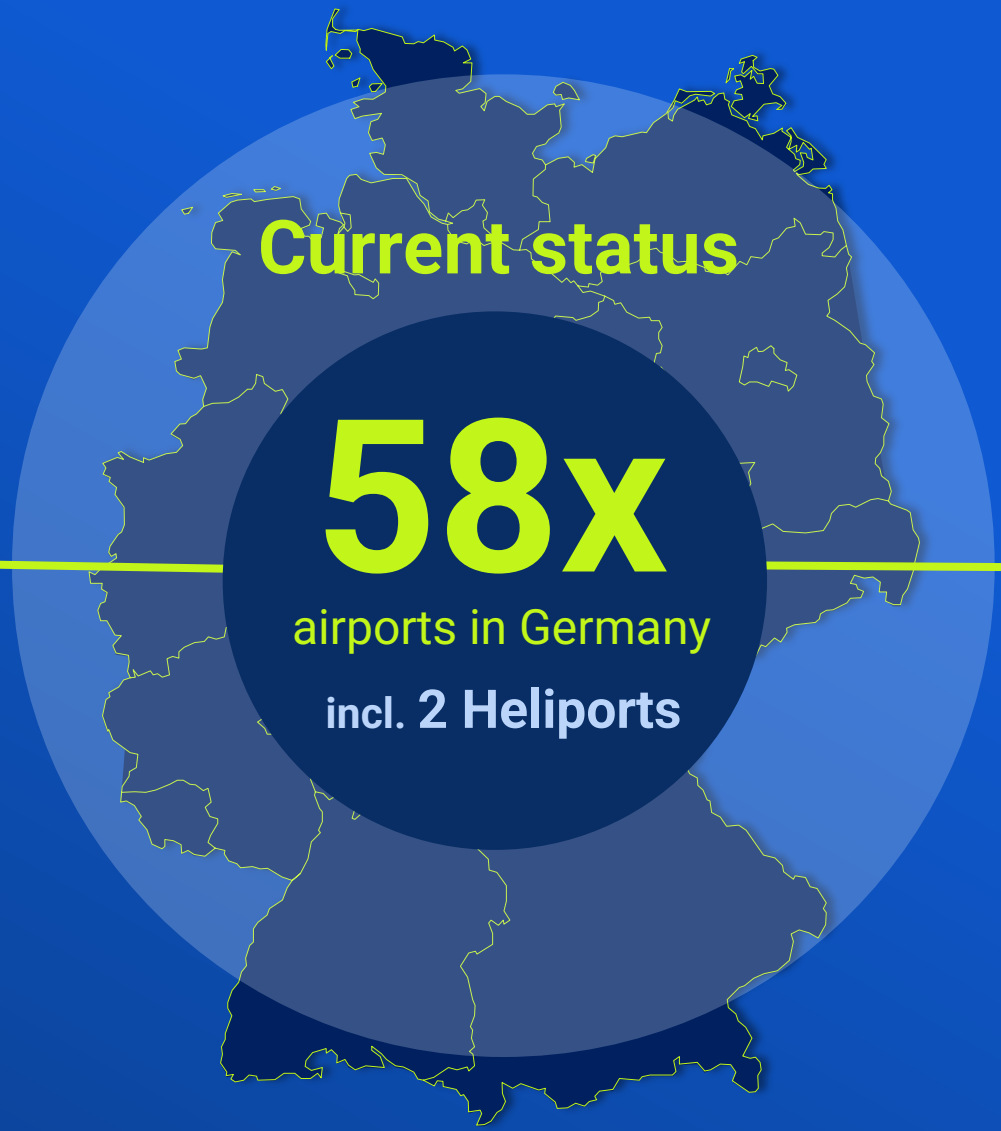
RNP 0.3 or RNP 1 or RNAV 1 for ATS routes established below FL150 for rotorcraft operations

RNAV 1 or RNP 1(+) applicable to all SIDs/STARs

RNP 0.3 or RNP 1 or RNAV 1 applicable to all SIDs/STARs for rotorcraft operations

until
06.06.2030

PBN Implementation in Germany



Airports
to be completed
until 2030

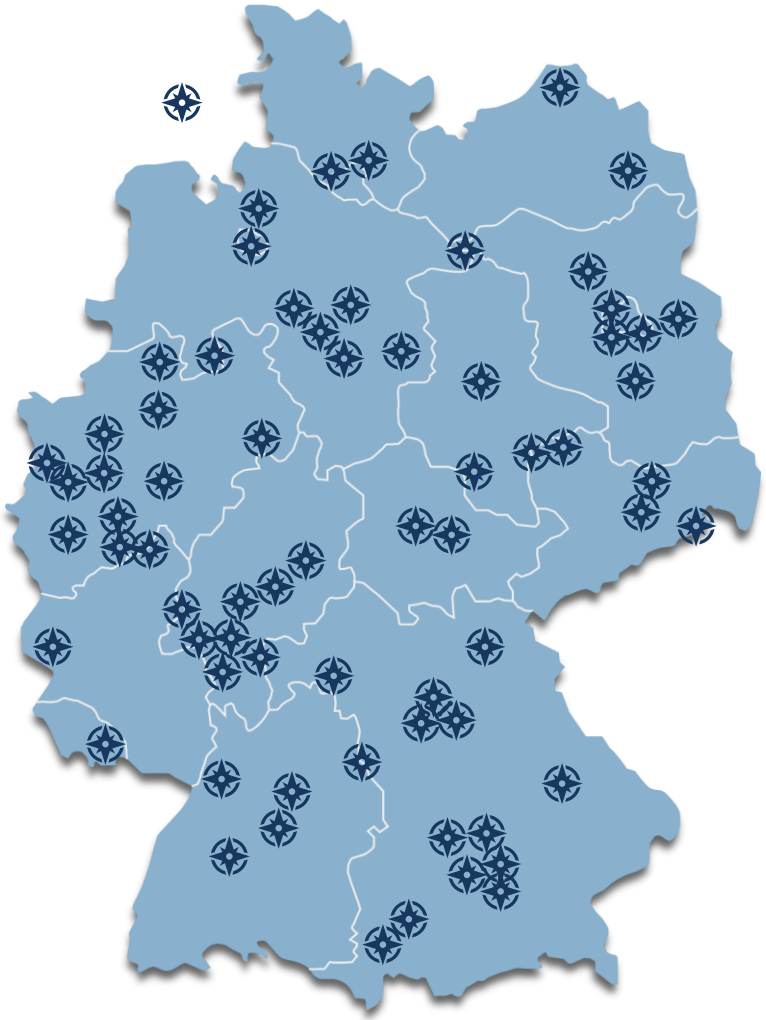
18x

38x

fully implemented
PBN airports
+ 2 Heliports

DFS‘s Navigation Infrastructure

Outlook



Enroute Navigation / Non Precision Approach

- 48 (D)VOR → -14
- 67 DME (21 stand-alone) → stand-alone +10…14
- 19 NDB → 0
- 2 TACAN → DEC 2025: 0
- 6 VHF Direction Finder → stable

2030 forecast

Precision Approach

- 15 Sites (Airports) with in total
- 45 Instrument Landing Systems (GE total: 82),
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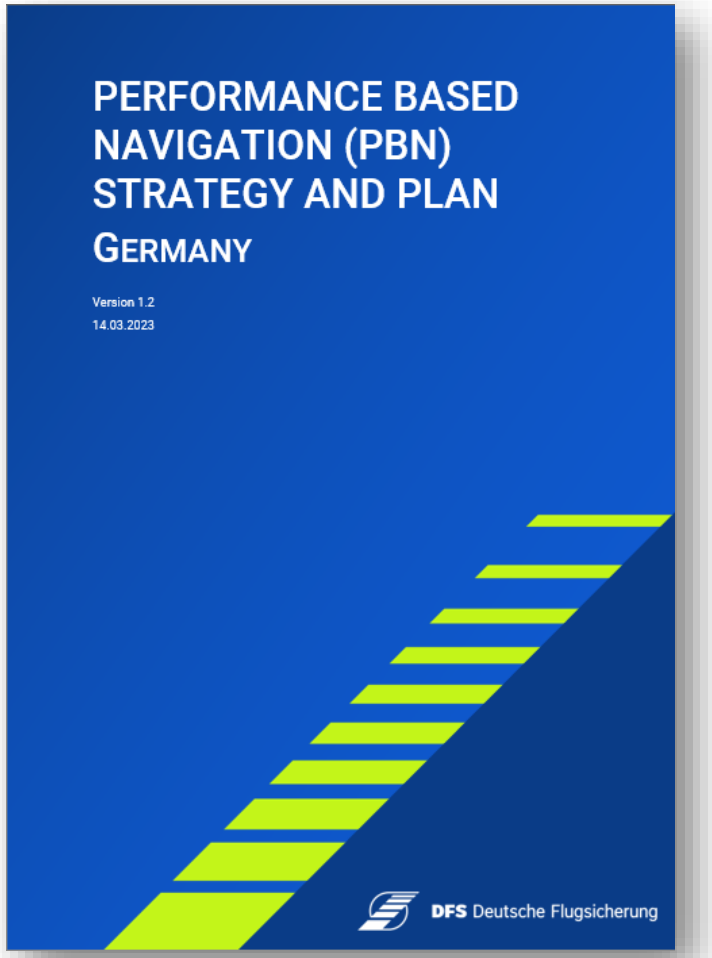
Satellite-based Procedures

- Offered at 60 German aerodromes

Updated Version of the PBN Transition Plan



- **Final approval of version 1.2 by competent authority**
- **Consultation with NM is complete since 15th of March 2023**
- **Development of MON started**

Update of the PBN-Transition Plan currently in progress

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Collaboration Between DFS and the EGNOS Programme

GBAS Cat II approaches supported by EGNOS

- **GBAS Cat II** approach procedures at Frankfurt Airport published since July 2022
  - All runway ends with both 3° and 3.2° glideslope
- **Operational Concept**
  - GBAS Cat II performance within acceptable ionospheric conditions only
  - Monitoring of current ionospheric conditions using **EGNOS** ionospheric information messages
- **Technical Implementation**
  - Upgrade of Honeywell SLS-4000 GBAS Ground Station by an integrated EGNOS receiver
  - providing SBAS ionospheric correction via EGNOS ionospheric information message types 18 and 26
- **Operational benefits** compared to ILS Cat II:

  Absence of ILS protection zones
  → Increased runway capacity

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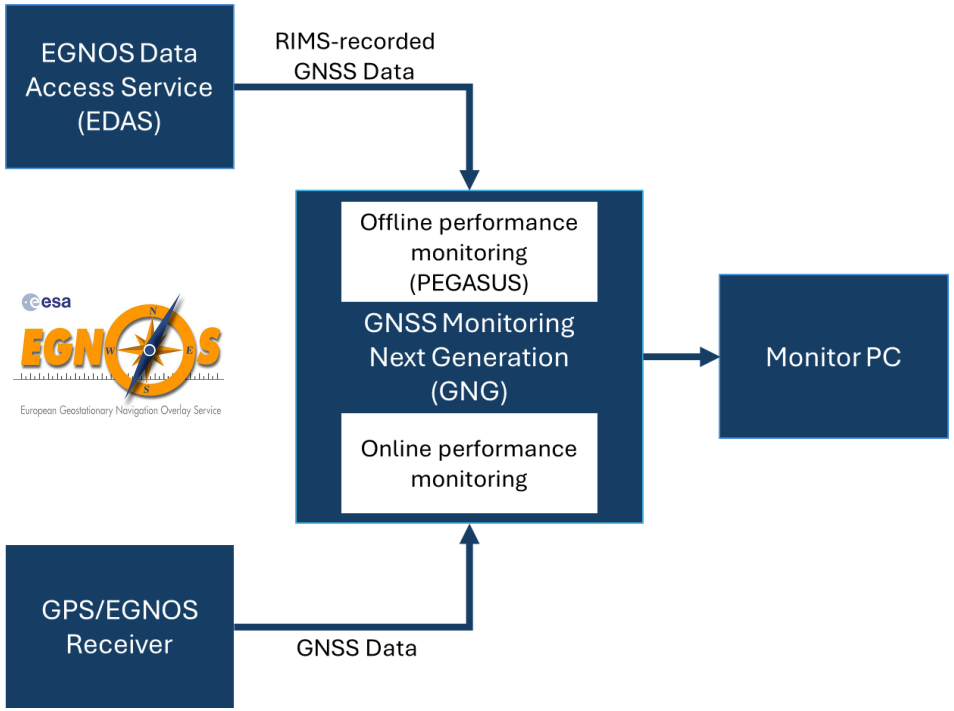
Collaboration Between DFS and the EGNOS Programme

Implementation of EDAS services for GNSS Legal Recording

- In the past, GNSS legal data recording was carried out using three GNSS receiver installations at airports across Germany.
- In 2022, we started to replace this network by EDAS services.
- Today, EDAS service is a core component of DFS's GNG system (GNSS Monitoring Next Generation) which forms the basis for
  - GNSS Legal Recording
  - GNSS Performance Monitoring
  - basic GNSS Interference Monitoring services



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Thank you very much!