Supporting European Aviation

EUROCONTROL

COM & NAV Bands Audits in Europe

SRWG/9

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Agenda

- Views on Frequency Management

- VHF COM usage in the World

- Frequency congestion in Europe

- Audits and Evaluation

  - Principles

  - Automated tool

  - Process

Frequency Management

The management of radio frequencies is vital for the safety and efficiency of ATC services

- Primary objective: Timely provision of suitable frequencies for aeronautical CNS systems
- Frequency Management is a State prerogative but coordination is required at regional level
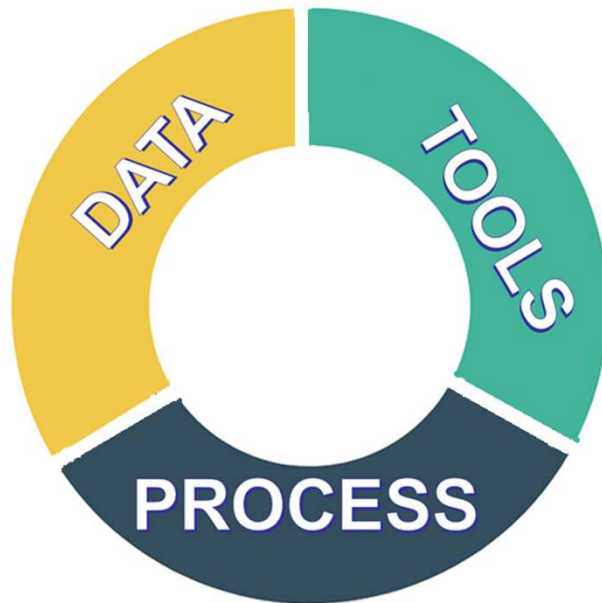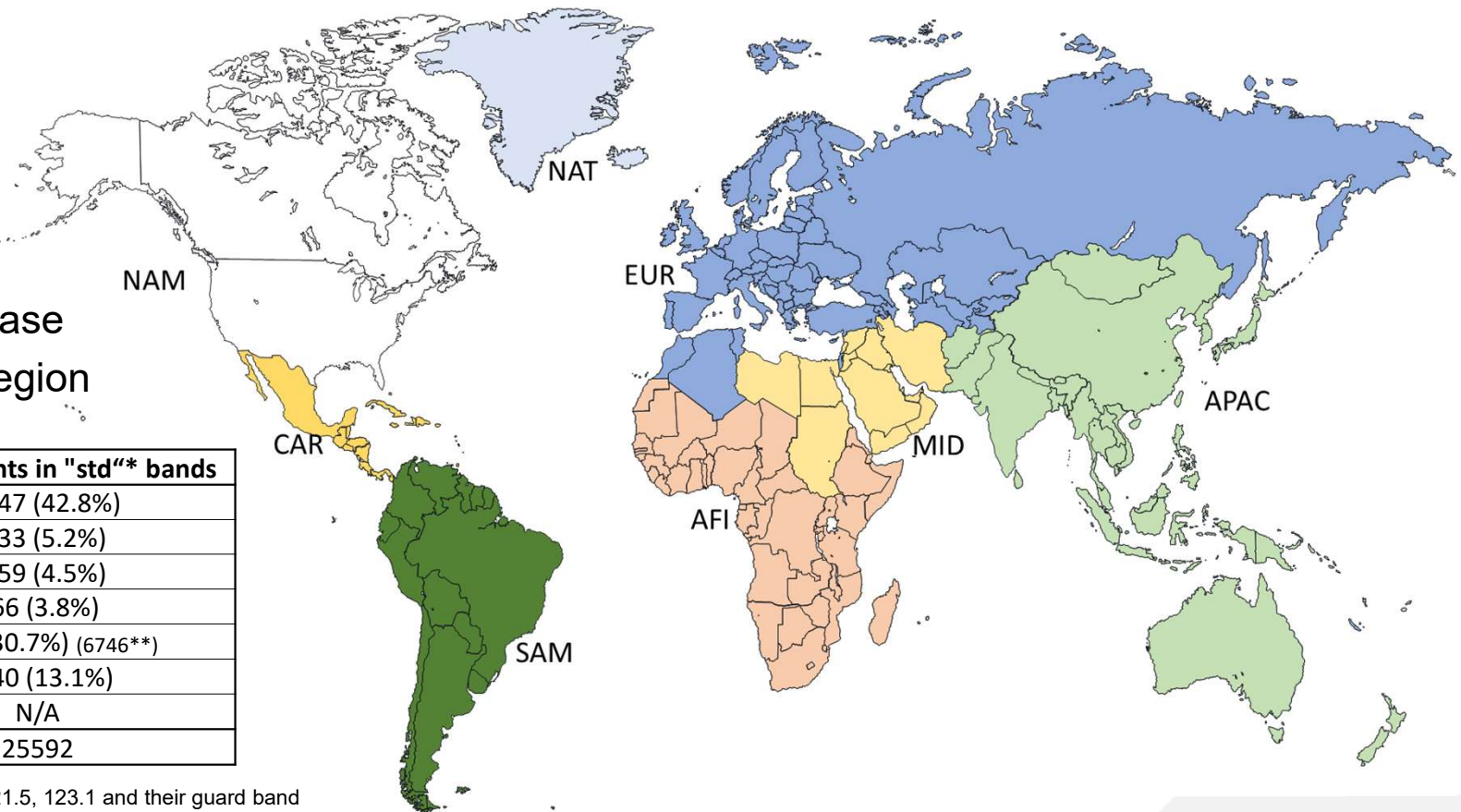

- **DATA**
  - Accuracy
  - Constantly Up to date
  - Operations oriented

- **PROCESS (Procedures)**
  - Coordination
  - Collaboration (States)

- **TOOLS**
  - Calculation
  - Data collection
  - Data analysis

The ICAO Global Database

- SAFIRE Database
- ICAO Global database
- No Data for NAM region

| ICAO Region	# Assignments in "std"* bands
EUR/NAT	10947 (42.8%)
MID	1333 (5.2%)
AFI	1159 (4.5%)
CAR	966 (3.8%)
APAC	7847 (30.7%) (6746**)
SAM	3340 (13.1%)
NAM	N/A
Total	25592

*Non OPC, AS, DL, special channels as 121.5, 123.1 and their guard band
According to EUR region practices
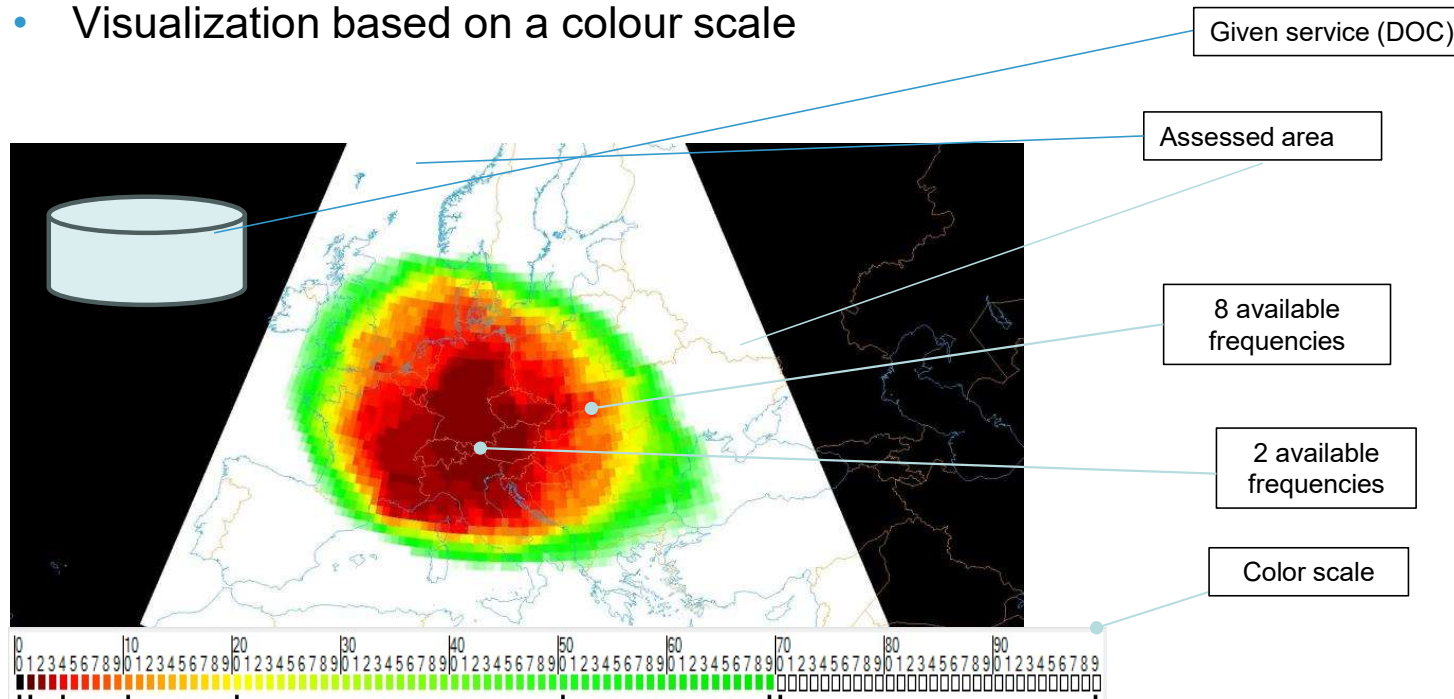** Taking into account the AOC band in APAC

VHF COM footprint density in the World (except NAM)

- Based on ICAO global Database & SAFIRE
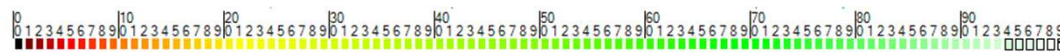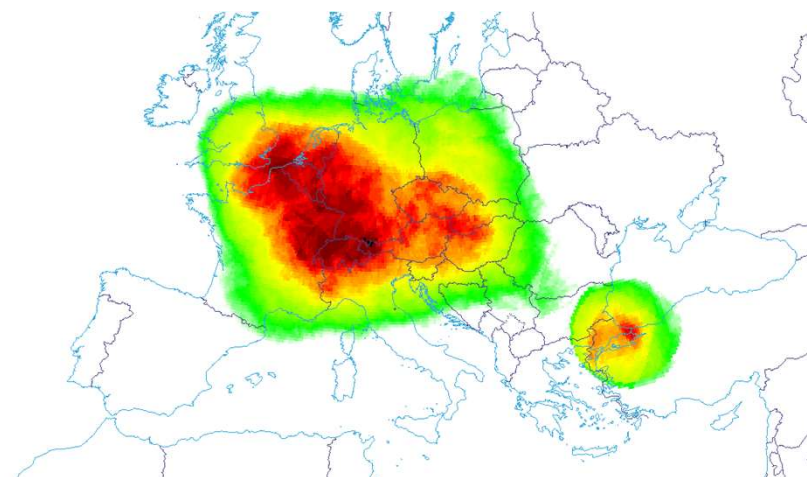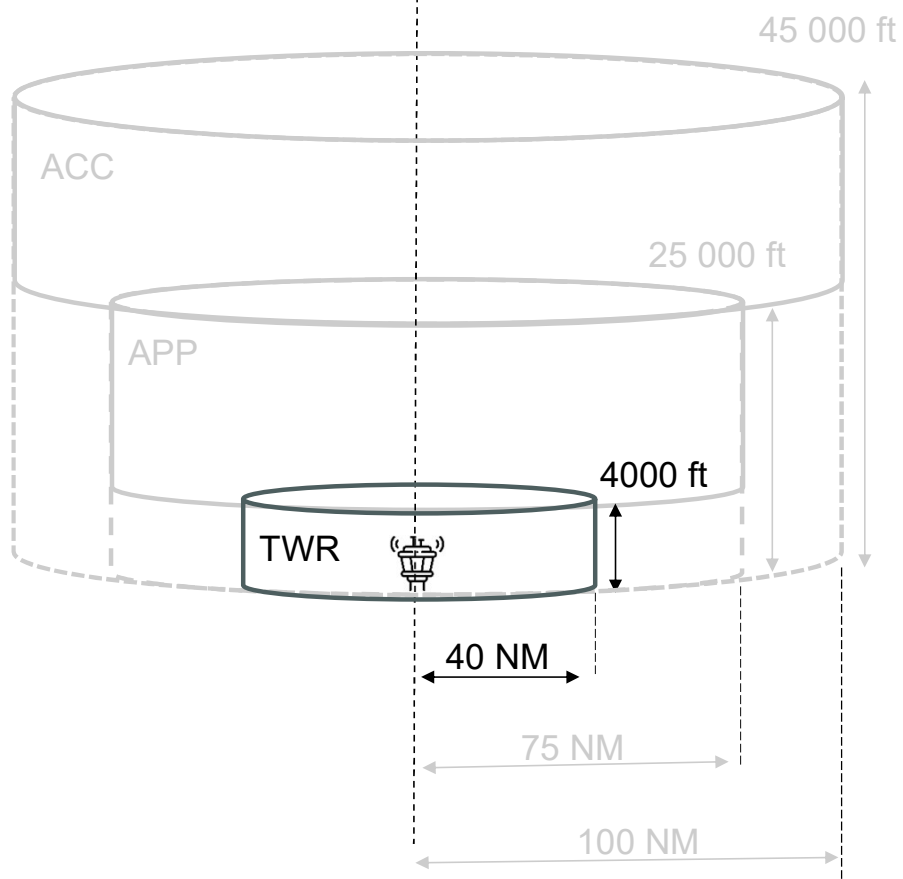
~ 1200 @ max

DOC

RLOS

Terrestrial Footprint
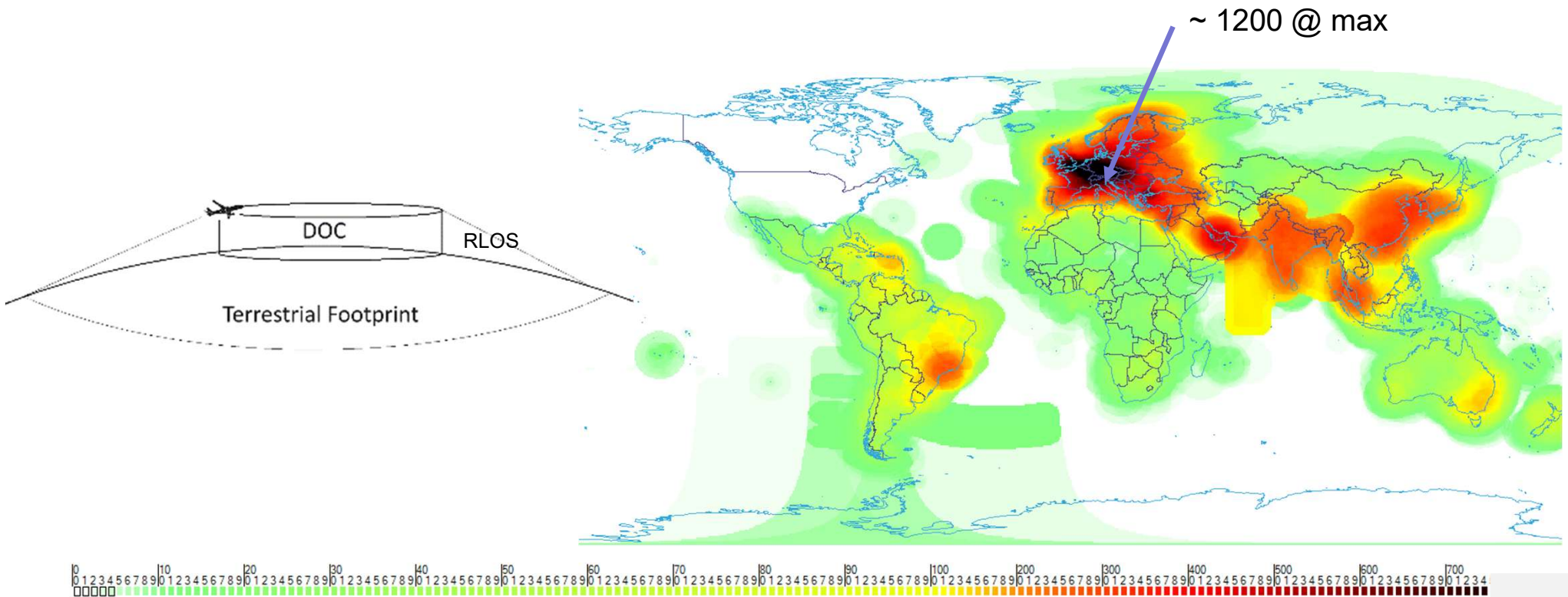
Congestion / Density Maps

- For a determined service (coverage + criteria)
- Number of potential frequencies available
- In a specific location
- Visualization based on a colour scale

Given service (DOC)
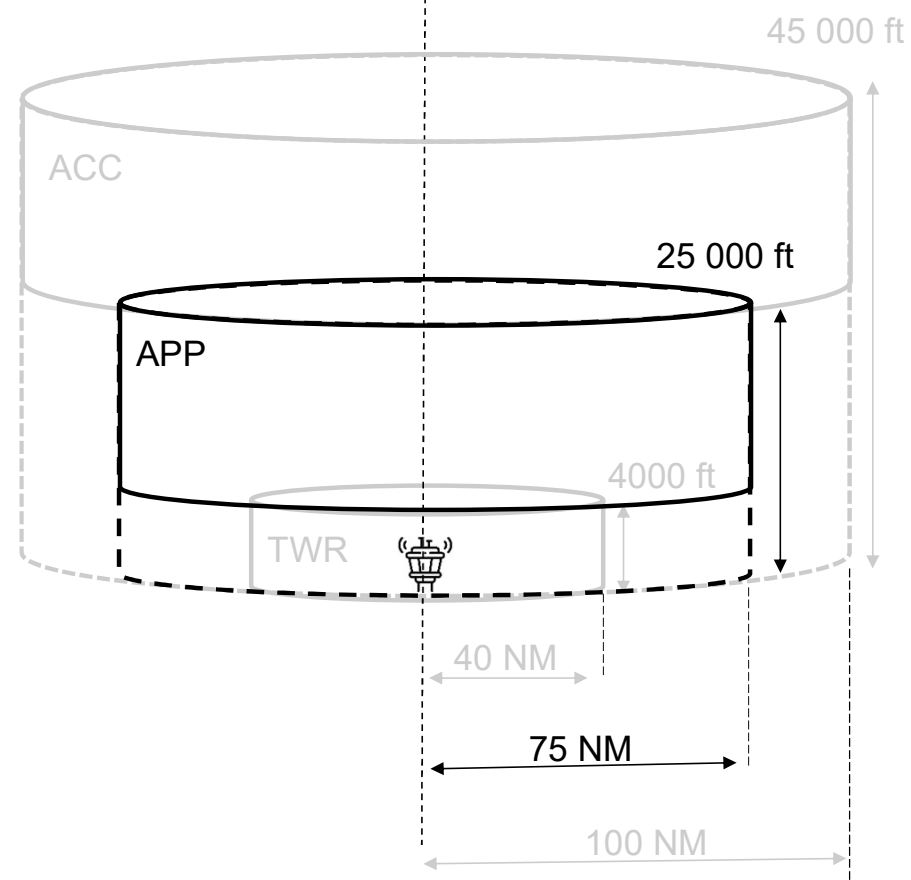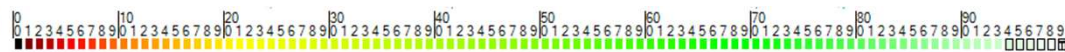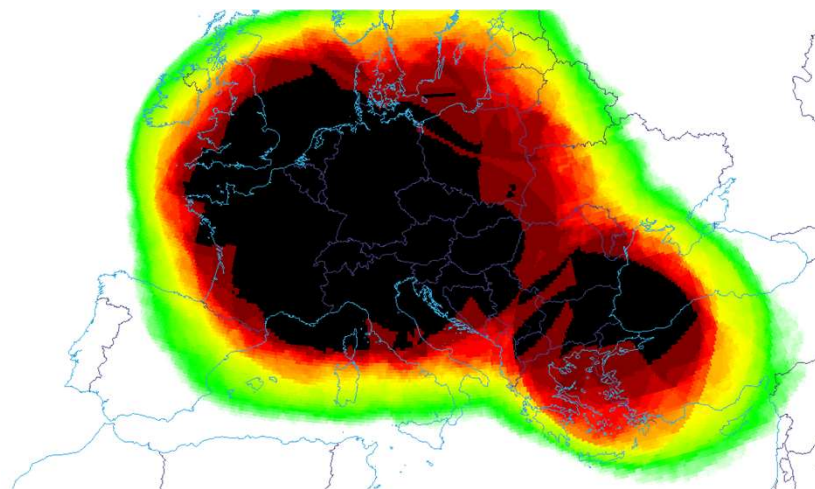
Assessed area

8 available frequencies

2 available frequencies

Color scale

COM Frequency Congestion in Europe

45 000 ft

ACC

25 000 ft

APP

4000 ft

TWR

40 NM

75 NM

100 NM

8.33 kHz

25 kHz

COM Frequency Congestion in E

45 000 ft

ACC

25 000 ft

APP

4000 ft

TWR

40 NM

75 NM

100 NM

8.33 kHz

25 kHz

COM Frequency Congestion in Europe

ACC

45 000 ft

25 000 ft

APP

4000 ft

TWR

40 NM

75 NM

100 NM

8.33 kHz

25 kHz
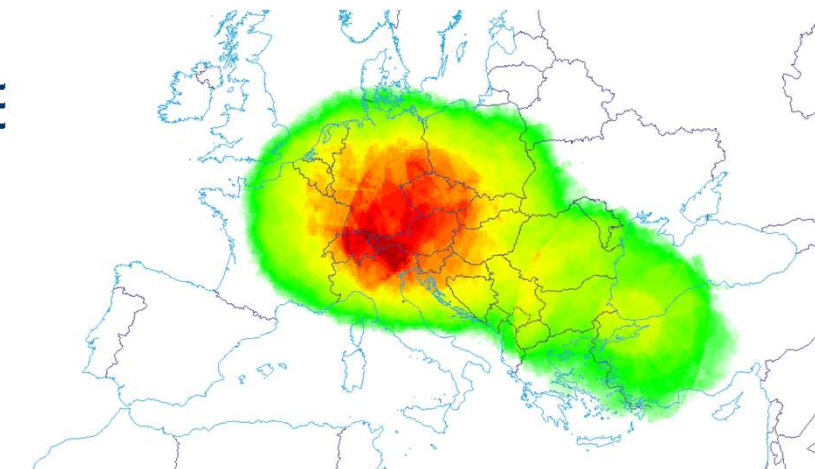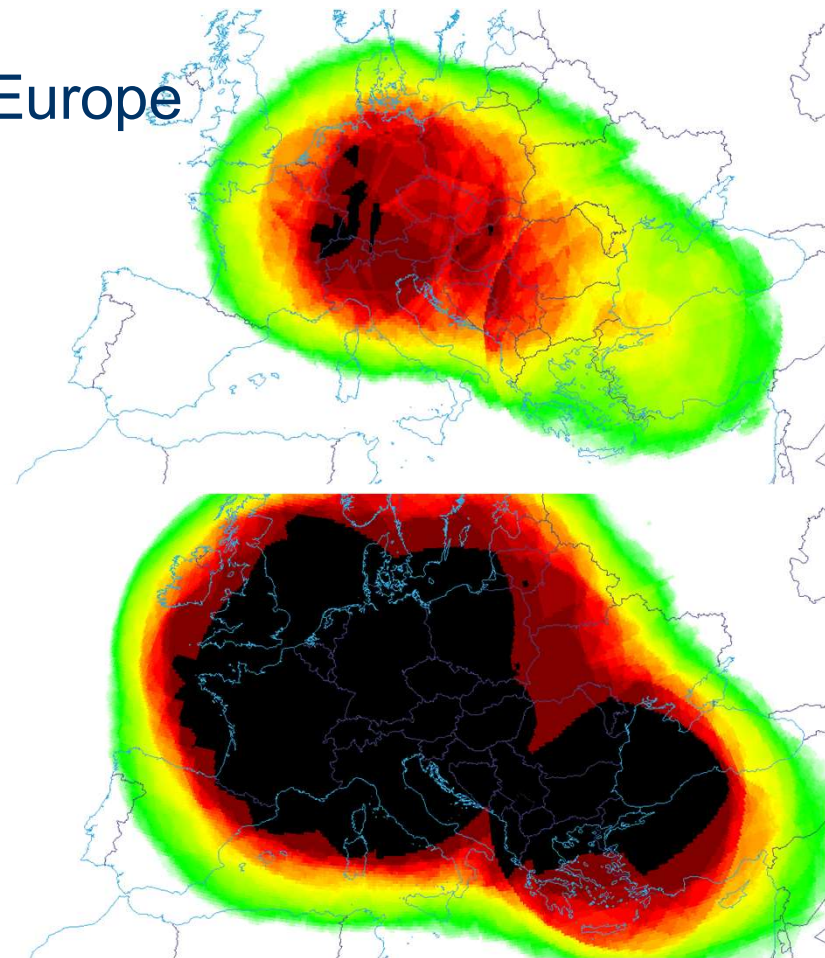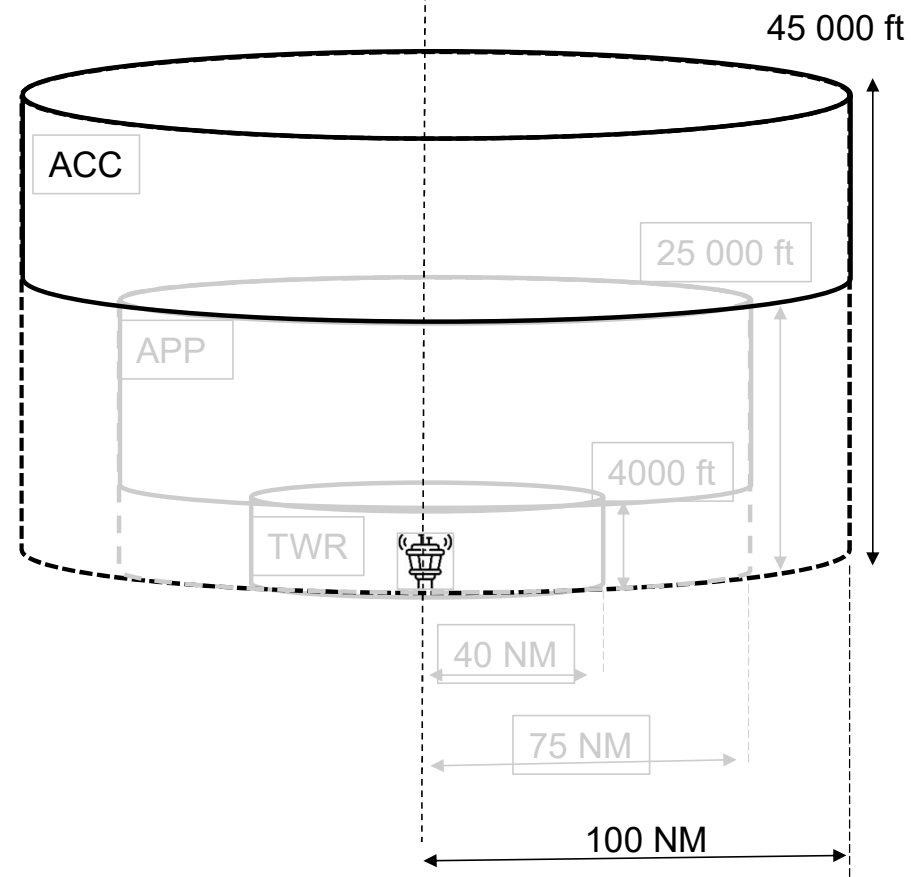
ILS & ILS DME Congestion in Europe
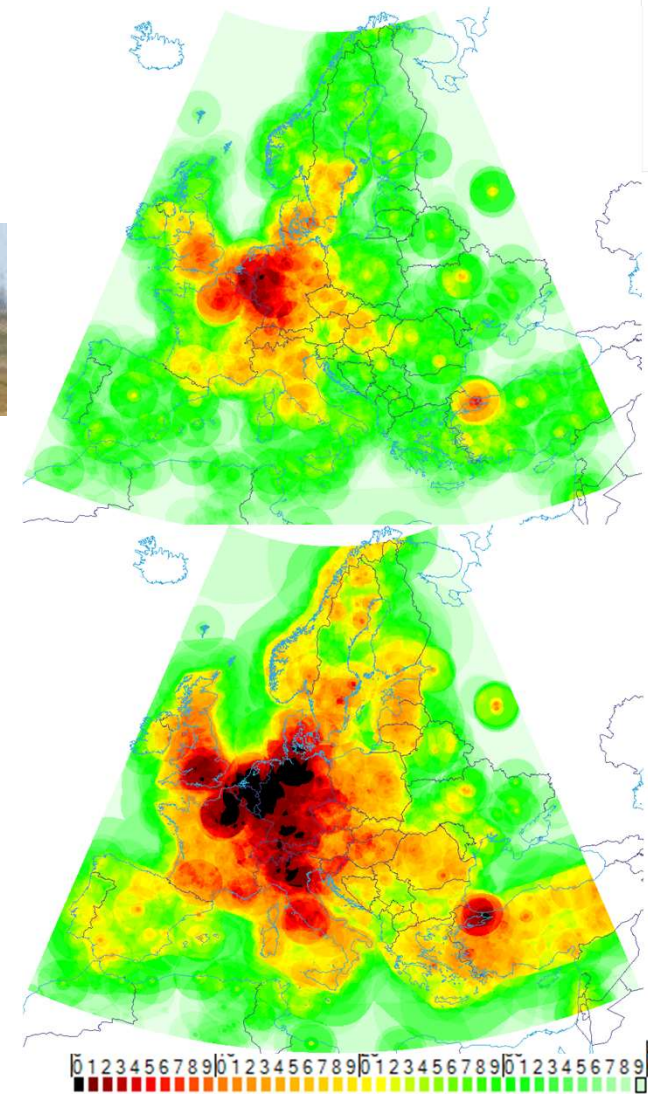
ILS

ILS/DME

VOR & VOR/DME congestion in Europe

100NM radius
50 000 ft

VOR

VOR/DME

$t_{Total} = t_1 + t_2 + 50 \ \mu sec$

$t2$

$t1$

$50 \ \mu sec$

$S = \dfrac{(t_{Total} - 50 \ \mu sec) \times (3 \times 10^8)}{2}$
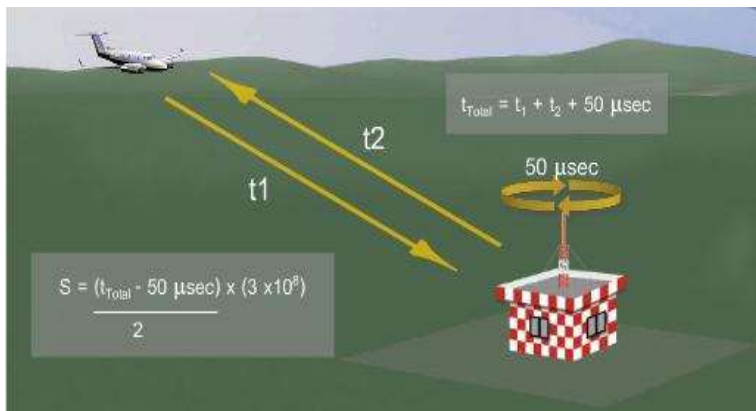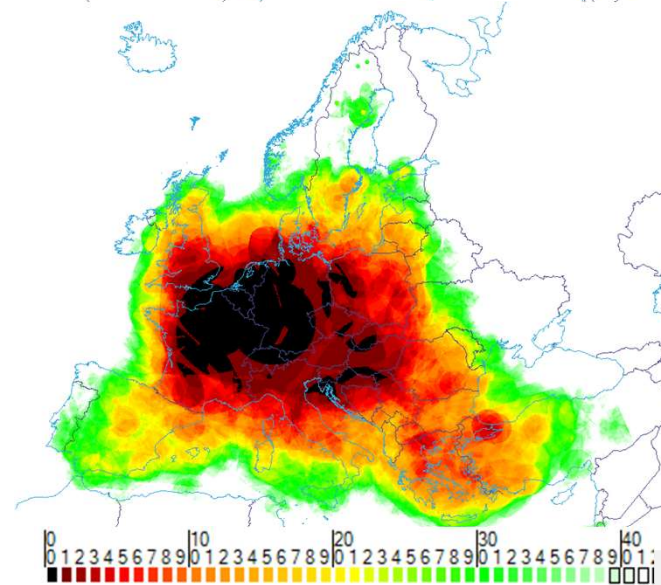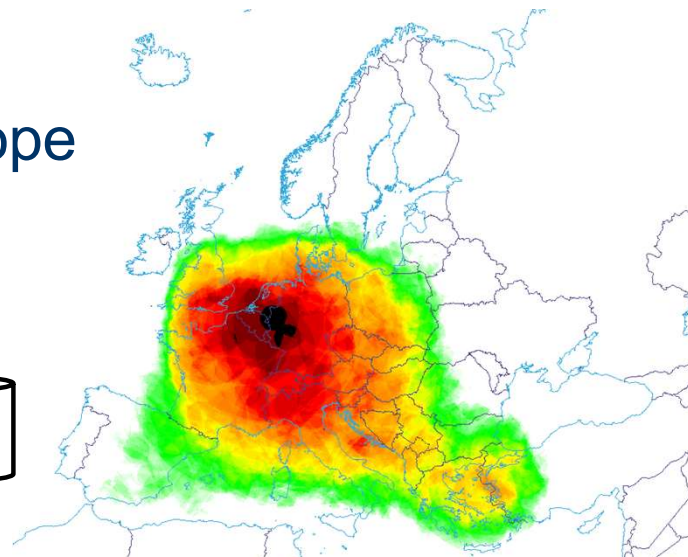
Audit & evaluation

- Every 2–3 years, a Frequency Database Quality Evaluation is conducted for COM and NAV

- Quantitative Approach
  - Are the declared frequency assignments truly in use ?
  - Are all the active frequency assignments declared ?

- Qualitative Approach
 - Are the active and declared frequency assignments correctly defined ?

Simple Data Consistency

- DOC Vs service (range & ceiling)

- Out of Band assignments (OPC, AS …)

- Volumes/Coordinates outside the State FIR it belongs to

- Other inconsistencies …

AIPs Analysis

- Using Aeronautical Information Publications (AIPs)
  - Paper (pdf format)
  - Digital (AIXM 4.5 / 5.1)

- Checking assignments
  - identify obsolete assignments for deletion
  - Verify if non coordinated assignments are operational

- Improving/correcting data details
  - Geographical Coordinates (correction and/or better accuracy)
  - Runway, TRD, ILS category
  - Navaids Ident
  - Transmitted power …
  - …..

- But Many Frequency assignments are not published in AIPs

AIPs
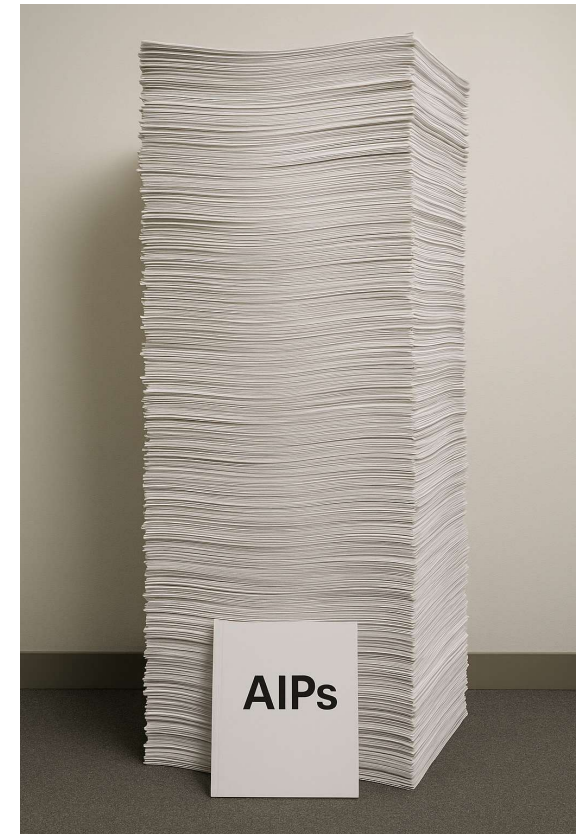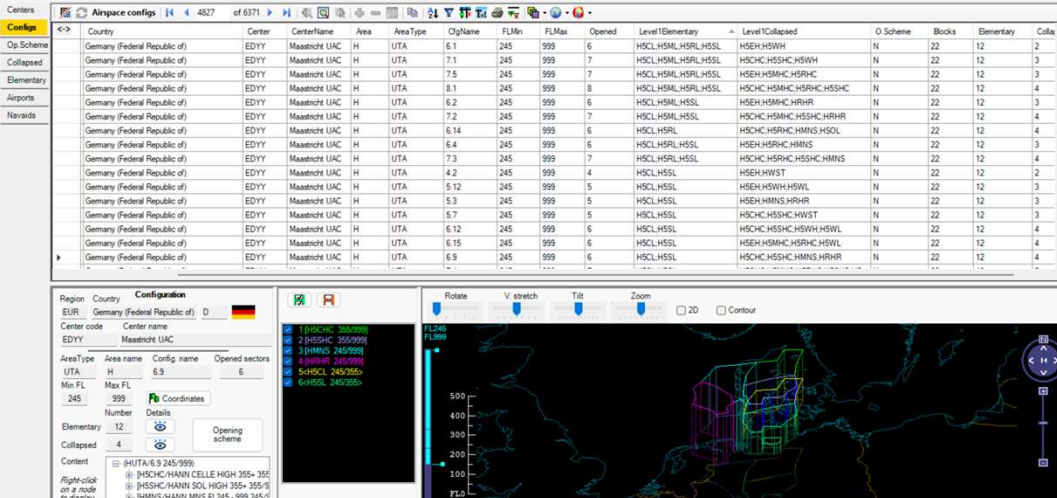
Frequency assignment Vs Operational Data

- Airspace data extracted every AIRAC cycle (28 days)

- Contains :
  - Aerodromes/Airports/Heliports
  - Navaids
  - ATC centers (ACCs and some airports)
  - ACC configuration and opening scheme
  - Elementary sectors and FIRs
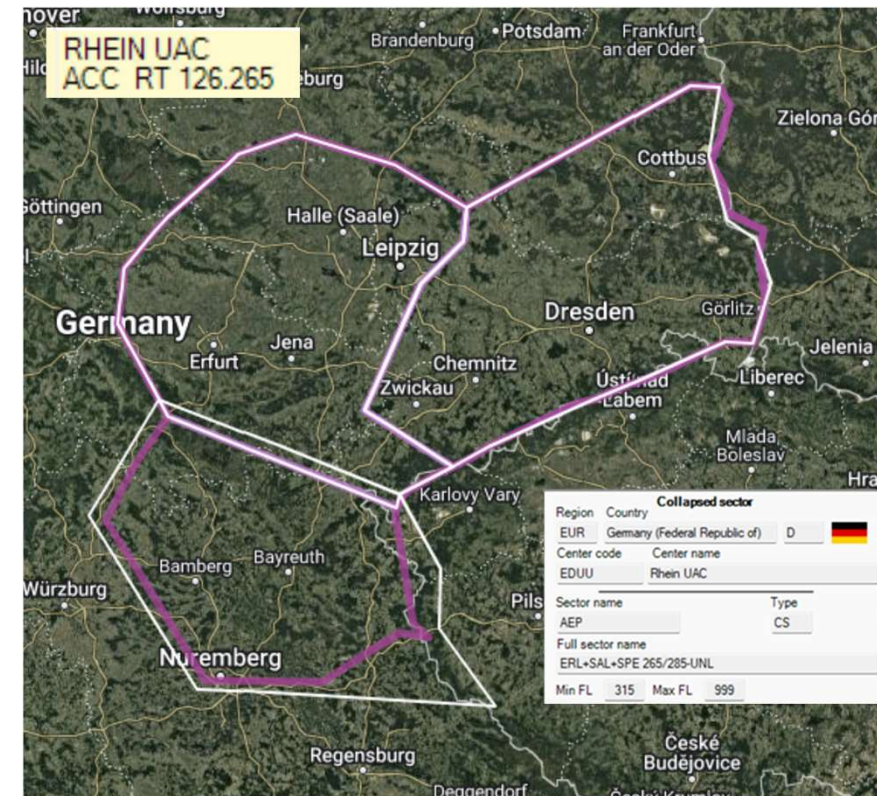 - Collapsed sectors and National Airspace

Frequency assignment Vs Operational Data

- Comparison
  - Number of Runways Vs Number of TWR frequencies
  - Number of sectors Vs Number of ACC frequencies
  - Number of ATIS per airport
  - Number of backup frequencies
  - ….

  - DOC Vs ATC sectors usage

Audit tool – MANIF AFM

- 57 States, 20,000+ frequency assignments (COM and NAV), thousands of AIP documents…

- Such audits cannot be done manually!

- Our frequency management tool MANIF-AFM automates the process:
  - AIP module
  - Airspace module
  - Automatic audit report generation

- Short demo

The Different Roles

State 1

Freq. Users

National Frequency Manager (NFM)

State N

Freq. Users

National Frequency Manager (NFM)

Data exchanges: Reports/Corrections

Network Manager
Radio Frequency Function
(NM RFF - EUROCONTROL)
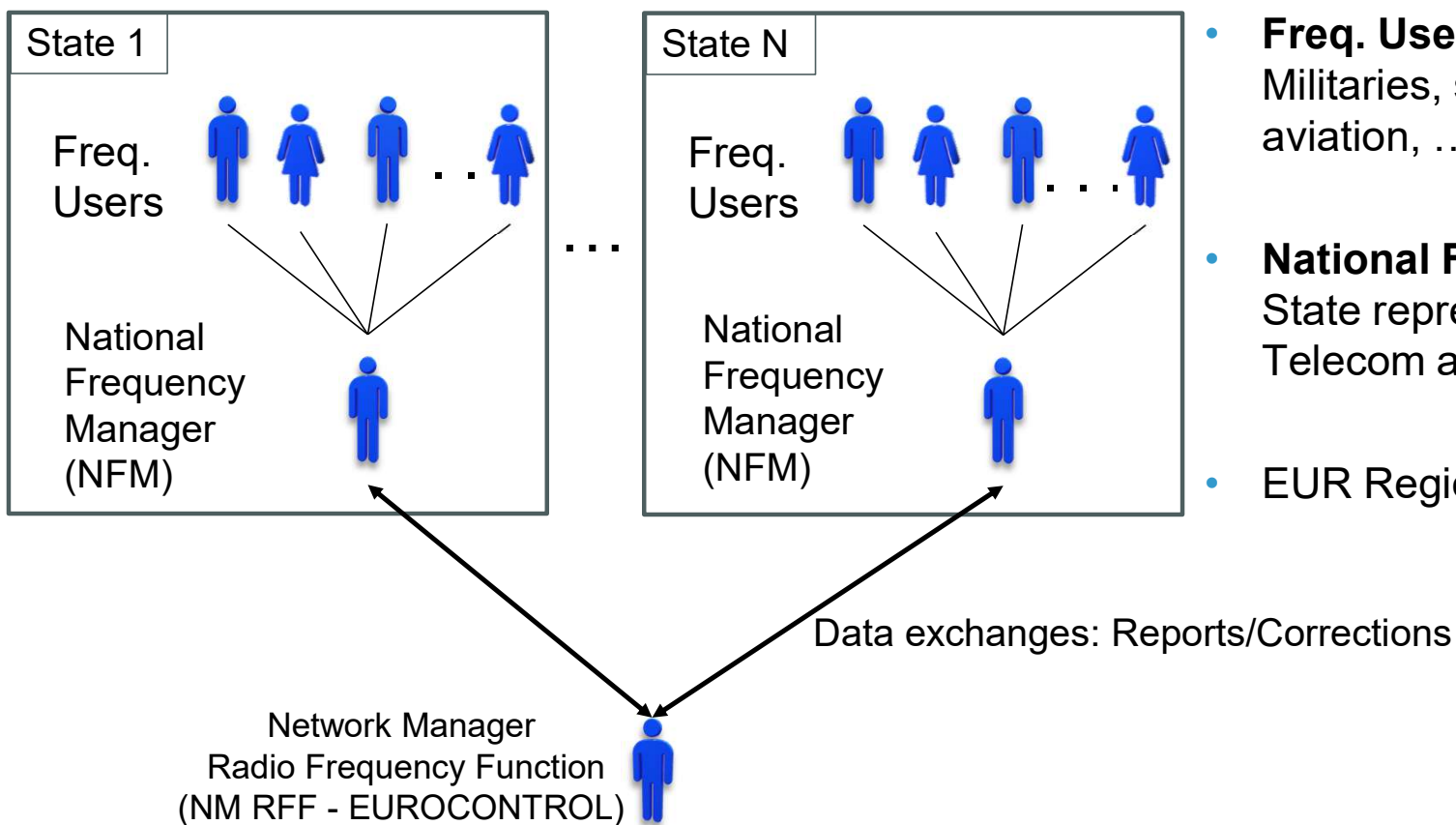
- **Freq. Users** : ANSP, Airports, Militaries, state authorities, General aviation, ….etc…

- **National Frequency Manager**: State representative CAAs or Telecom authority

- EUR Region : 57 states

Conclusion

- Each audit corrects or deletes hundreds of assignments

- The process is largely automated, keeping audit effort and cost low

- We maintain high data quality

- Fewer surprises and less interference

- Most EUR States recognize the shared interest and fully participate

Discussion, Questions …

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