EUROPE FOR AVIATION

ADS-B Implementation Plan

Introduction

Nicolas Warinsko
General Manager
SESAR Deployment Manager

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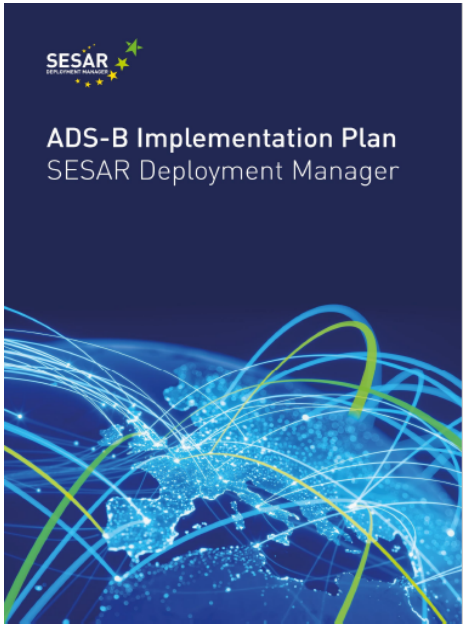
ADS-B Implementation Plan

Overview and Next Steps

Cristian Pradera & Jan Stibor
SDM Planning Manager, ADS-B Programme Manager

ADS-B Implementation Plan



Delivered to EC on December 21st, 2018

Full support and buy-in by consulted stakeholders

Two cornerstone elements

- ***Status and prognosis charts on Air and Ground domains***
- ***Support to policymaking concerning Exemptions***

Conclusions of the ADS-B workshop

Letter from Henrik Hololei to the stakeholders

*The **final implementation dates** set out in Regulation (EU) n. 1207/2011 and its amendments **stand and must be met***

*All stakeholders were invited to **communicate their implementation plans to the SESAR Deployment Manager** (SDM) to feed the "Air-Ground synchronised ADS-B implementation plan"*

*The plan will be **developed by SDM and consulted and agreed with all stakeholders by end 2018** and will go **into the execution phase in January 2019***

*All stakeholders were **invited to continue their ADS-B implementation***

*In the context of the "Air-Ground synchronised ADS-B implementation plan" the **exemption and incentives policies** will be examined and potentially modified*

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ADS-B Implementation Plan - Overview and Next Steps

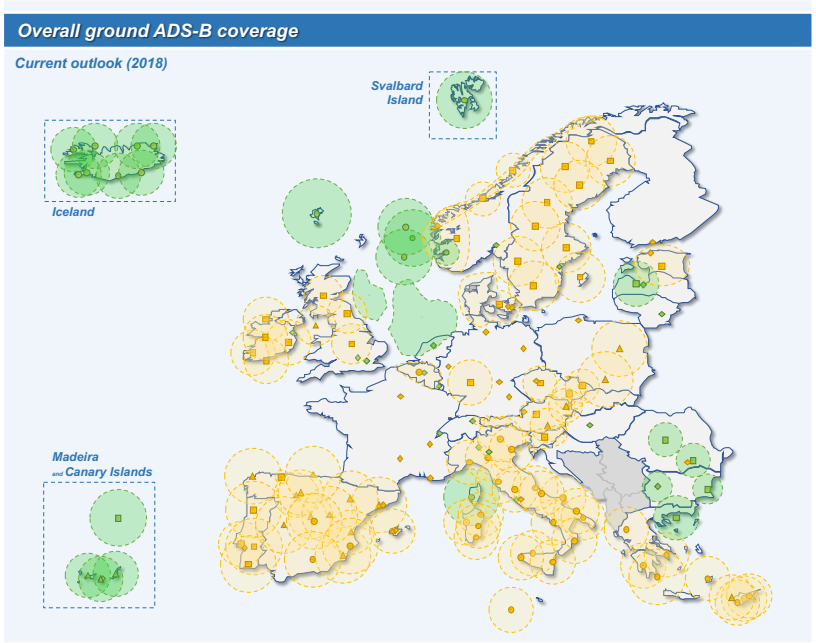
Ground domain status

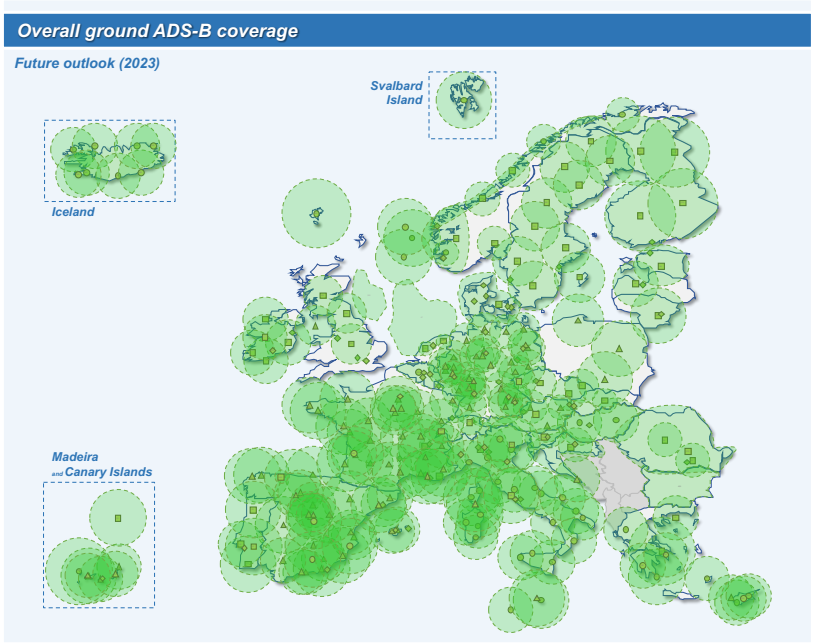
Airborne domain status

Exemptions decision support

Way forward

ADS-B Implementation Plan





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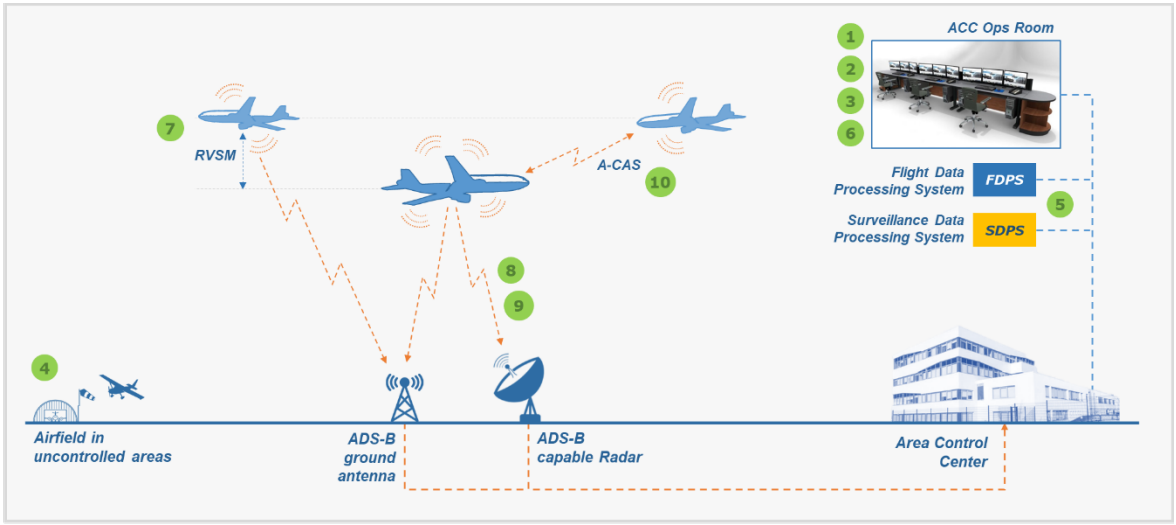
- Many envisaged use cases for ADS-B Out.



List of applications

1. Traffic surveillance to support Flight Information Services and alerting
2. Surveillance beyond AoR border
3. Traffic data collection
4. Surveillance in uncontrolled airspace
5. Performance improvements in trackers and trajectory predictors
6. Driving Extended AMAN
7. RVSM conformance monitoring
8. Passive acquisition
9. ADD substitution
10. Extended hybrid ACAS

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ADS-B Implementation Plan - Overview and Next Steps

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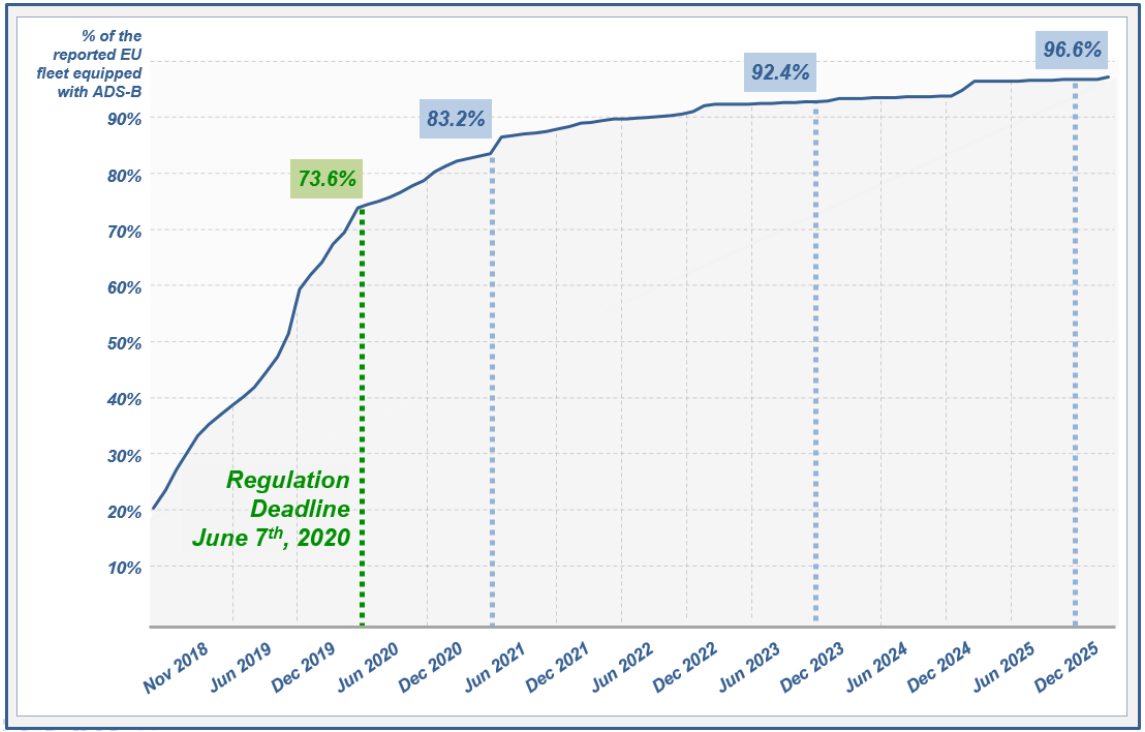
Way forward

ADS-B Implementation Plan

Civil EU-reg fleet

$n_{reported} = 3772$

Note: legacy (V0/V1) transponders, not shown.



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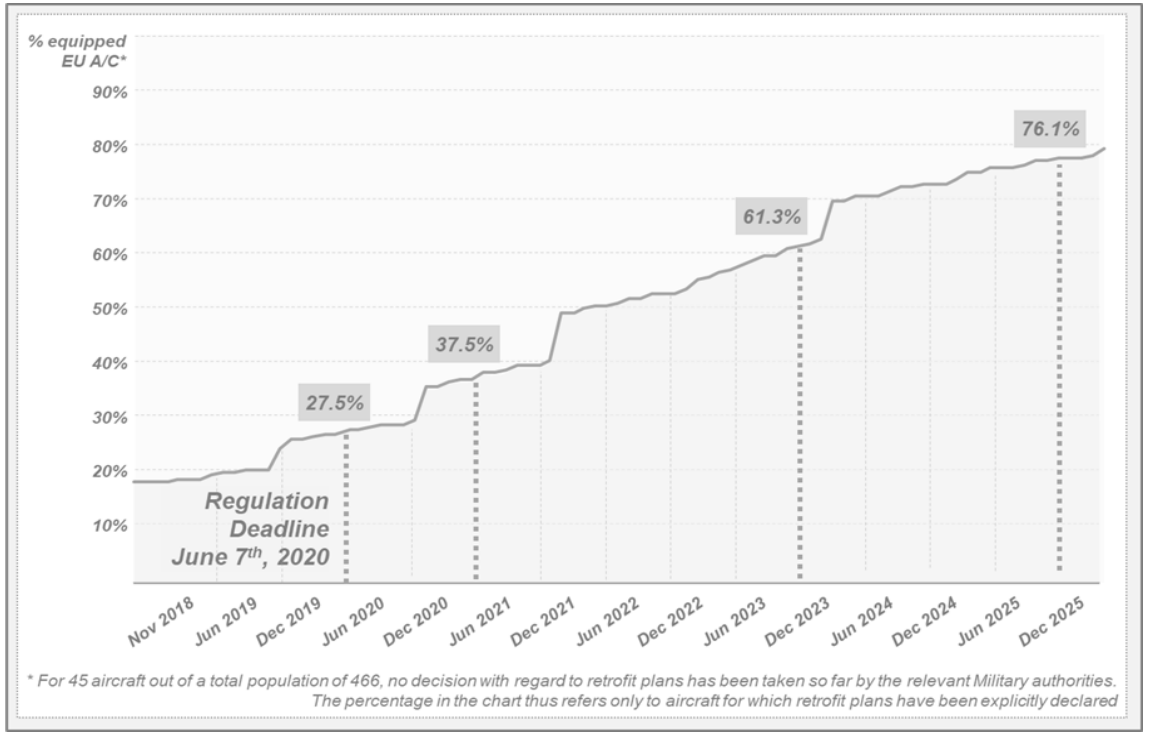
EU military fleet
transport category

$n_{reported} = 466$

ca 50% of total
mandated fleet

retrofit plans reported
for 170 airframes



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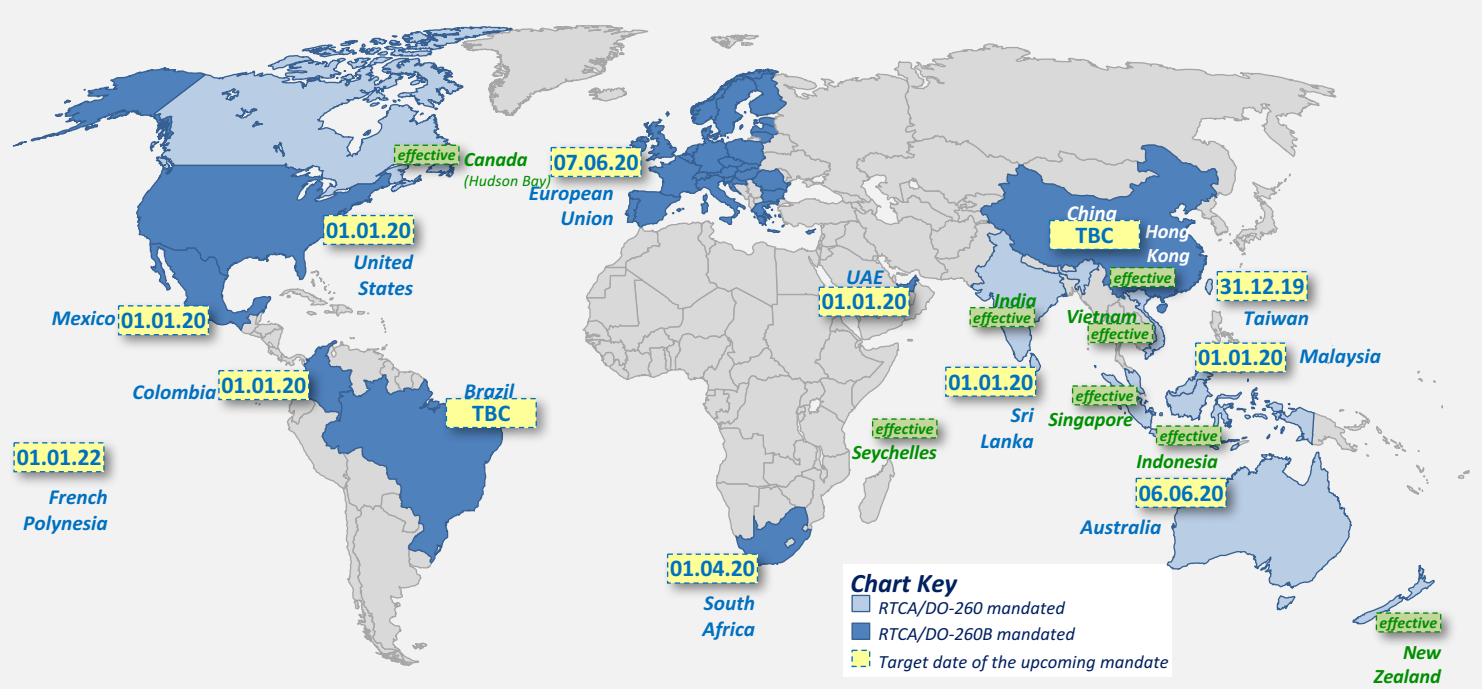
ADS-B Implementation Plan



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ADS-B Implementation Plan - Overview and Next Steps

Ground domain status

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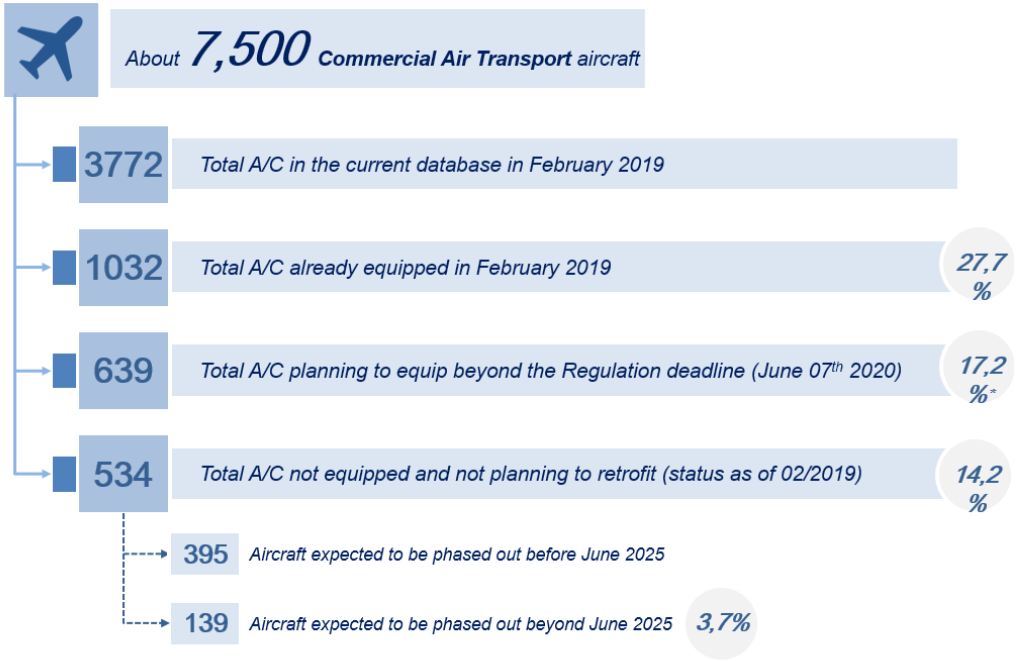
- Clustering of aircraft by compliance with the mandate on 7/6/2020
- What could be done.



*Percentage calculated on the basis of the total population of A/C at February 2019

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ADS-B Implementation Plan - Overview and Next Steps

Ground domain status

Airborne domain status

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Way forward

ADS-B Implementation Plan

Dedicated SDM website launched at www.ads-b-europe.eu

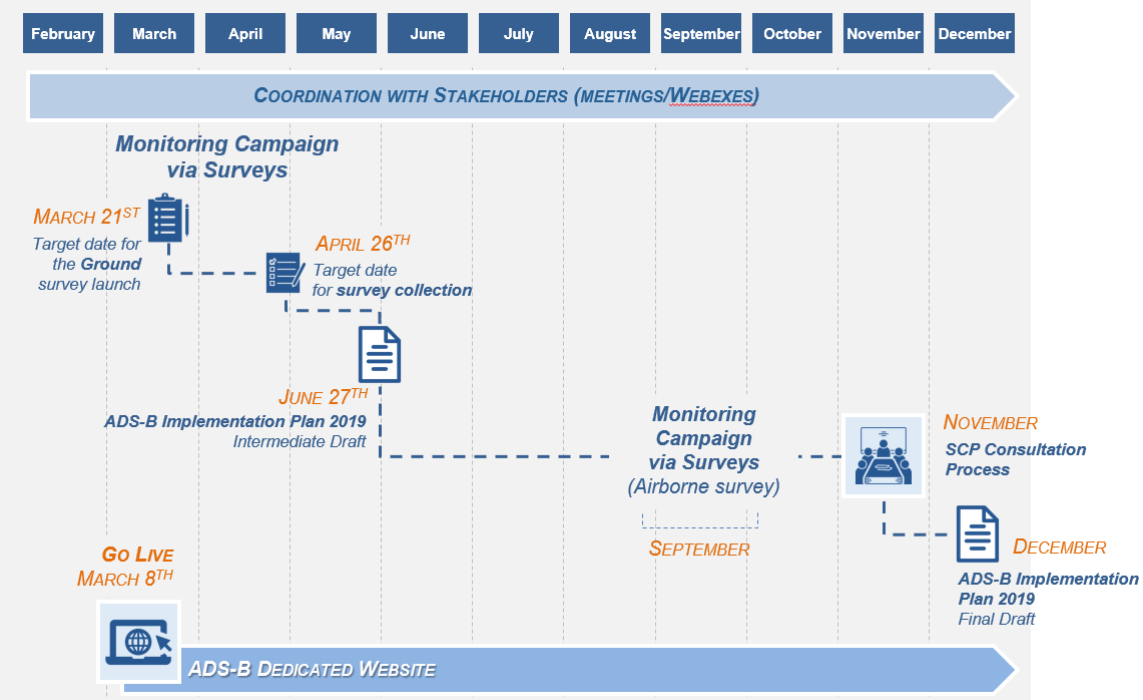
The main purpose is to provide all stakeholders with up-to-date access to aggregate implementation status data

It will also feature news and information linked to ADS-B deployment

COMING SOON

ADS-B Implementation Plan

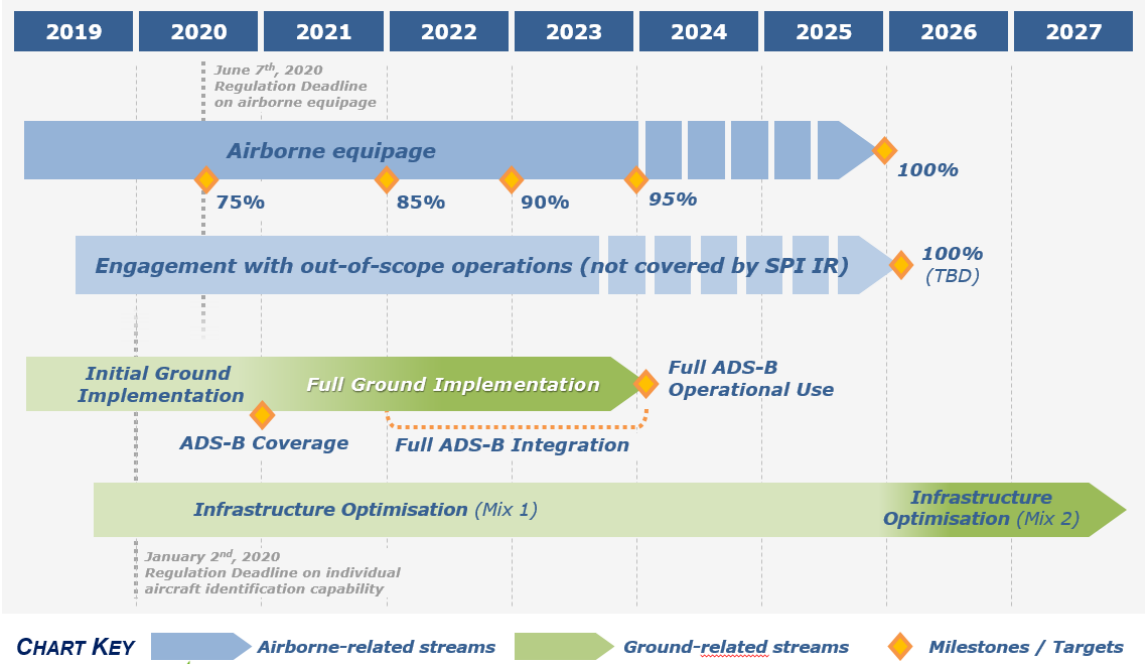
- 2019-2020
- (short term)



ADS-B Implementation Plan

- 2021-2025
  (long term)

  - EC
  - SDM
  - Eurocontrol/NM
  - EASA
  - EDA
  - industry



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ADS-B Implementation Plan - Overview and Next Steps

Thank you!

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Operational and Technical Enhancements using ADS-B

Johan Martensson
Surveillance Expert, **EUROCONTROL**

Operational Enhancements (1/3)

Surveillance Coverage – from Local to Global

- **ADS-B is Simple, Flexible and Passive – enabling increased surveillance coverage**

Examples of current SUR coverage enhancements:

- **Remote area:** **NAT SUR Corridor, Shanwick, Santa Maria, Reykjavik FIRs, Svalbard,…**
- **Regional:** **Lower altitude surveillance**
- **Gap fill:** **North Sea, Baltic Sea, lower altitudes in many areas of Europe, ..**
- **Other:** **Aircraft Tracking (GADSS), Traffic Awareness, ATFM, RVSM/HMU, Environment [CO2, Noise,..],..**

Operational Enhancements (2/3)

Seamless operations with harmonised Separation Minima

- **Remote:** From Procedural (40-80nm) to SUR based (5-17nm)
- **Continental:** 3/5nm everywhere, where needed

Safety Nets and ATC tools

- STCA, MSAW, APW, A-SMGCS functions, ADD, ACAS

Mitigation for service outages - Back-up

- Avoiding capacity constraints

Operational Enhancements (3/3)

Enhanced ATS (FIS, SAR,..)

Airspace Infringements

Collision Avoidance mitigation

Airborne SUR Applications (ADS-B IN)

- **AIRB, CAVS, SURF A/IA, IM, TSAA/ATAS – improving Safety, Capacity, Efficiency**

Technical Enhancements (1/2)

Infrastructure Optimisation – from Complex to Simple

- Towards ADS-B plus MON (Mode S, MLAT)
- Improved ACAS

High Update rate & Accuracy

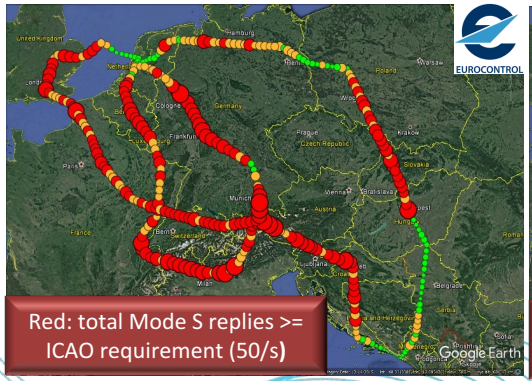
- 2 Position and Velocity msg/s with high accuracy

Technical Enhancements (2/2)

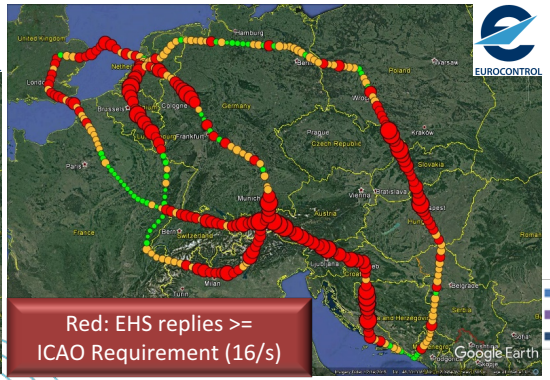
Spectrum efficiency – from Active to Passive SUR

Reducing:

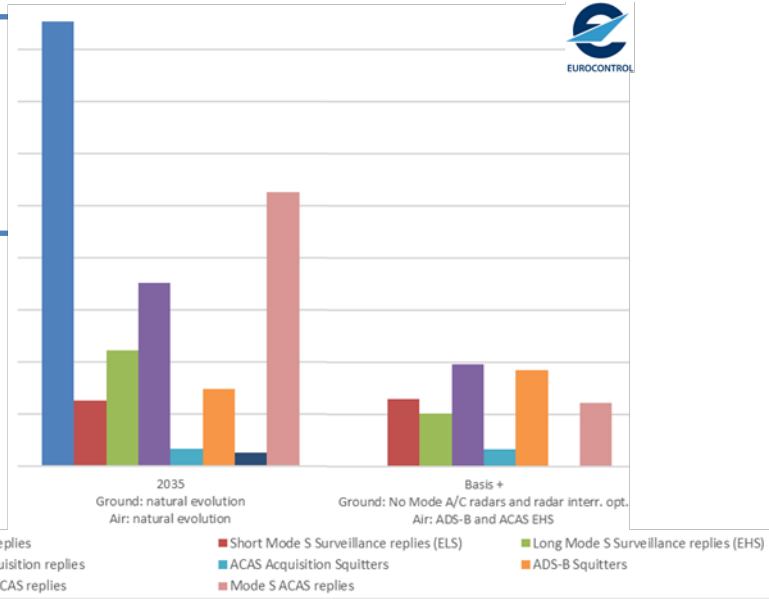
- **Mode S DAP extraction**
- **Mode S All-Call**
- **ACAS interrogations and replies**



Red: total Mode S replies >= ICAO requirement (50/s)



Red: EHS replies >= ICAO Requirement (16/s)



Conclusions

Network Performance Enhancements using ADS-B

ADS-B is Simple, Flexible and Passive

- **Expanding Surveillance Coverage**
- **Improving Surveillance Performance**
- **Improving the Use of Surveillance Data in ATM**
- **Reducing Spectrum Impact**
- **Enabling growth and future concepts**

Timely integration required

Work in partnership for an optimal transition

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Operational and Technical Enhancements using ADS-B

Thank you for your attention !

Johan Martensson
Surveillance Expert, **EUROCONTROL**

EASA
European Aviation Safety Agency

Regulation 1207/2011
Exemptions

Bryan Jolly
Senior Expert - ATM/ANS

Your safety is our mission.

EASA is an agency of the European Union

ADS-B & MODE S equipage requirement

Regulation 1207/2011 – laying down requirements for the performance and the interoperability of surveillance for the single European sky.

All flights operating as **general air traffic** in accordance with **instrument flight rules** within the airspace provided for in Article 1(3) of Regulation (EC) No 551/2004

ATS providers which provide ATC services based on surveillance data, and to CNS service providers which operate surveillance systems

Airborne Mode S Elementary Surveillance

..7 June 2020

Airborne ADS-B Out & Mode S Enhanced Surveillance[1]

..7 June 2020

No exemptions permit from the carriage requirements

1. MTOW 5700 Kg or max cruising > 250 Kts

Ground Systems

- Exchange of Surveillance data
- Surveillance chain must be capable of identifying individual a/c from the downlinked a/c ID
- System must be efficient

Current exemptions

No exemptions permit from the carriage requirements (ADS-B or MODE S)

Article 14 – Exemptions on aircraft

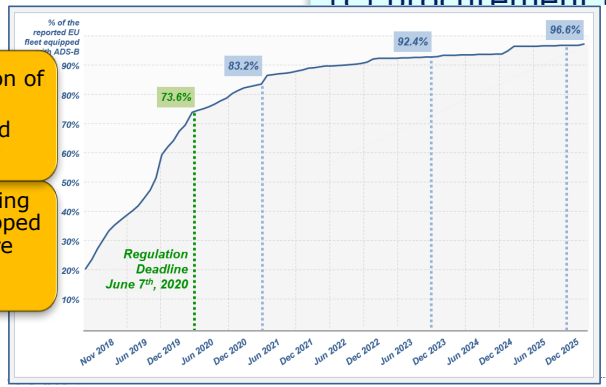
Mode S EHS (Part C of Annex II) – May be exempt from full compliance – notification justifying the need by 1 January 2019

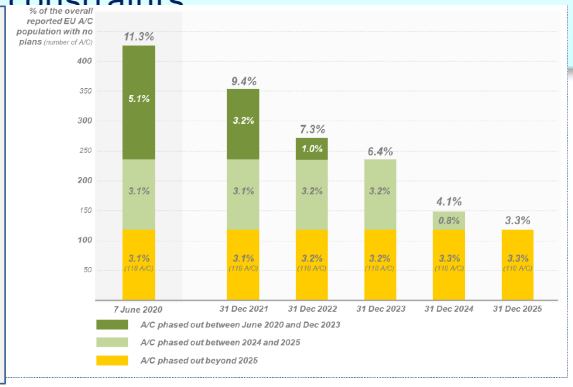
Article 8(3) – State aircraft

(a) compelling technical reasons;
(b) State aircraft that will be out of service by 1 January 2024;
(c) procurement constraints

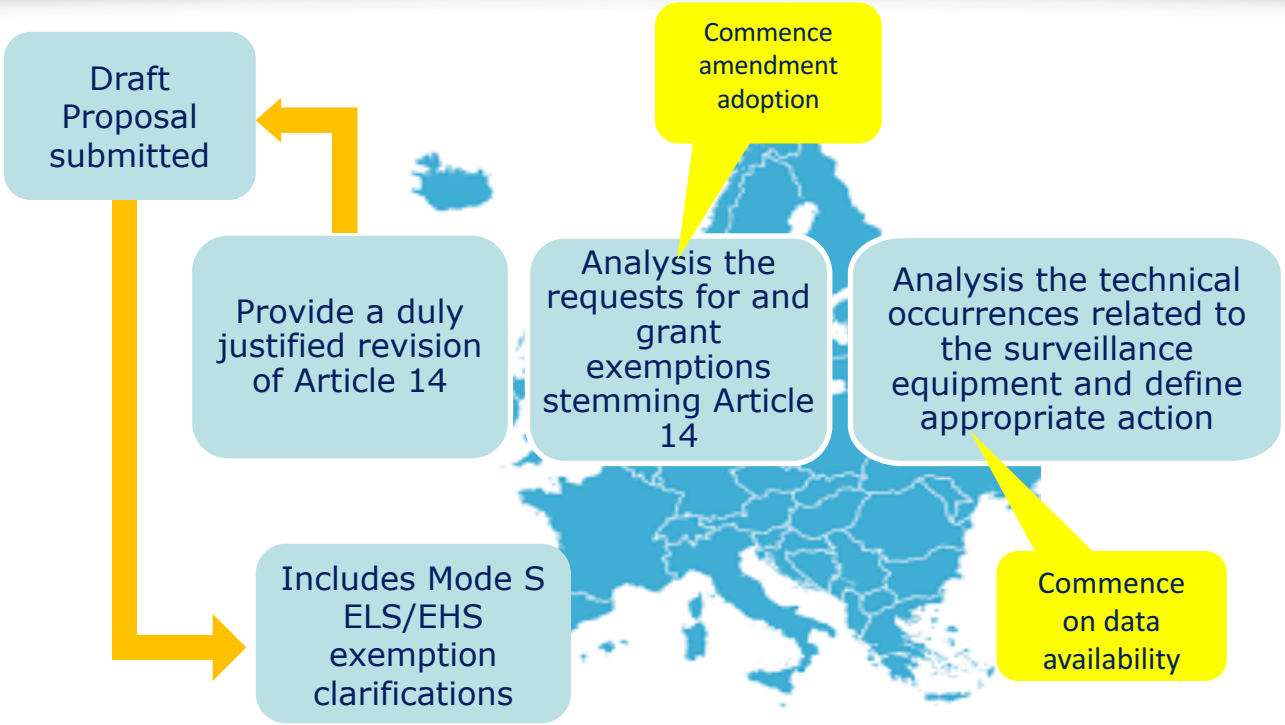
RMT.0679 - Revision of surveillance performance and interoperability

100 to 150 existing aircraft to be equipped per month before 2020: industry capacity?





ADS-B Exemptions & EASA role



Exemption condition

Main exemption condition to permit managed aircraft equipage delay

- Aircraft with CoA post 7 June 2020 will be compliant
- Operators of aircraft with a fist CoA before 7 June 2020 may be granted an exemptions under specific conditions
- a retrofit program has been established demonstrat compliance prior to TBA
- aircraft cease operations within the airs prior to 7 TBA.
- exemptions shall be in a form and established by EASA and shall be submitted prior to TBA.

No change to the scope for airborne community

New clause for **ANSPs to use ADS-B data**

Change of transponder requirement to comply to **Annex 10** to the Chicago Convention, Volume IV, Third Edition including all **amendments up to No 77**.

Addition clause for Non equipage of ADS-B & EHS for of **maintenance, delivery or flight testing** (ELS must be installed)

Clarification of **continuity** requirements

Clarification of **MEL** for ADS-B & EHS

DRAFT

First Draft text	Consultation	Adoption EASA CMT	In force
March 2019		Q3 2019	Q3 2019

Additional Consideration

What about General Aviation ?

RMT.0679 – concluded "as there is no immediate safety or operational issue, a correctly formulated action plan needs to be developed by the Agency taking into account the anticipate operations of general aviation and drones."

Established a CNS Implementation Expert group

- **General Aviation ADS-B requirements** - to assess what should be the minimum requirements, enabling the reduction the radar interrogations and provide a full SUR picture.

RMT.0376 Anti-collision systems on aircraft other than aeroplanes in excess of 5 700 kg or 19 pax.

Are all unintended consequences addressed?

Spectrum assessments – especially if using the existing ADS-B technology for all users.

GNSS vulnerabilities need to be fully assessed to ensure safety

EASA
European Aviation Safety Agency

Any questions?
Thank you for your attention

Your safety is our mission.

EASA is an agency of the European Union

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ADS-B Deployment

ADS-B Military View

Oberstleutnant Dipl.-Ing. Sven Rensmeyer
EDA Project Officer SESAR

EDA'S REINFORCED MISSION

In May 2017, after EDA's LONG TERM REVIEW,
Defence ministers agreed to reinforce the Agency's role and mission

- as the **main instrument**
  for intergovernmental capability planning & prioritisation in Europe
- as the **prime forum and coordinator**
  for the whole lifecycle of capability development
- as Member States' **central interface & gateway**
  towards EU institutions & stakeholders

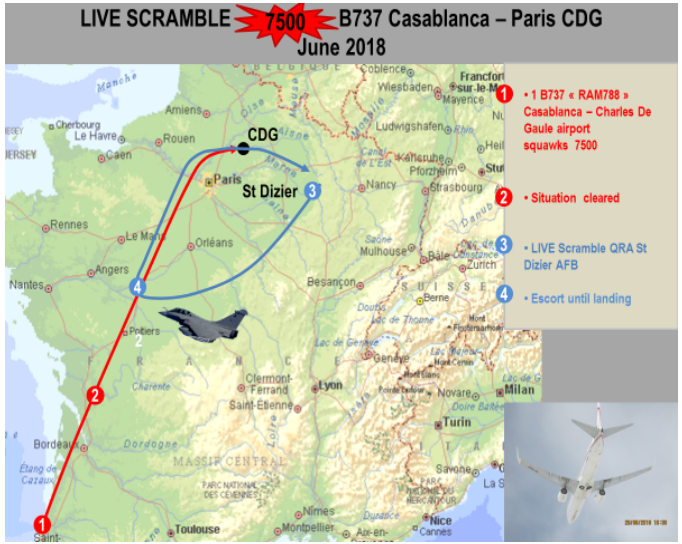
EUROPEAN DEFENCE AGENCY

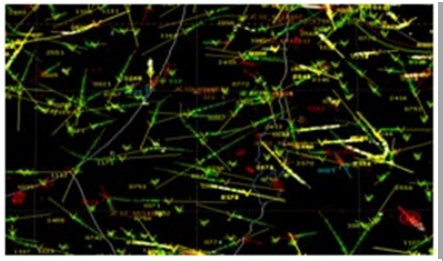
www.eda.europa.eu

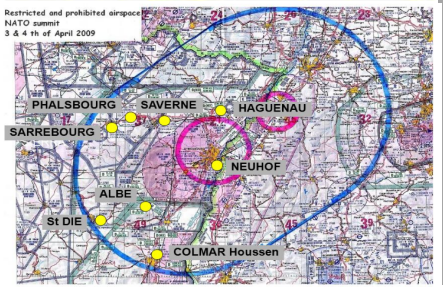
The Fleet – The Stakeholder

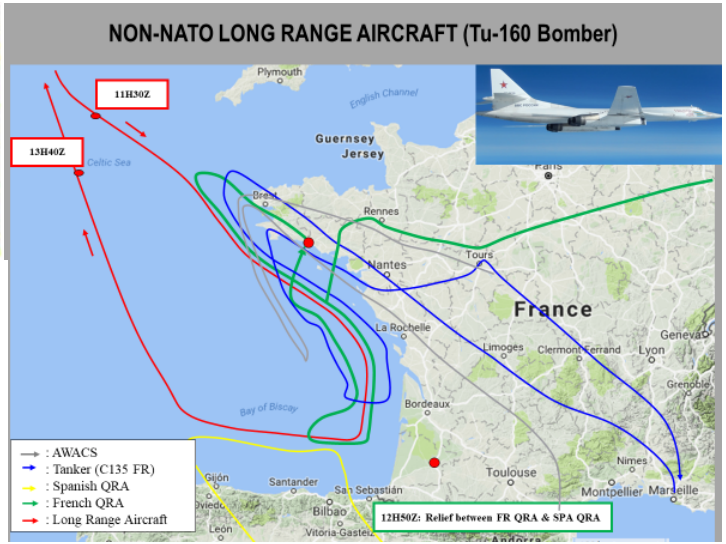
Asset	Number
Combat Aircraft	2300
Helicopters	3000
Light Transport Aircraft	1300
Heavy Transport Aircraft	420
RPAS (All types)	420
Airfield	220

Security and Defence – Common Responsibility









…and preserving passenger confidence in a complex security environment

Ground considerations

AINonline BIZAV AIR TRANSPORT DEFENSE ROTORCRAFT PODCAST

ADS-B Is Insecure and Easily Spoofed, Say Hackers

by Matt Thurber - September 3, 2012, 12:45 AM

The ADS-B system that is the cornerstone of the FAA's NextGen ATC modernization plan is at risk of serious security breaches, according to Brad Haines, a hacker and network security consultant who is worried about ADS-B vulnerabilities. Haines first outlined his concerns during a presentation he gave at the Def Con 20 hacker conference in Las Vegas in July. Automatic Dependent Surveillance-Broadcast (ADS-B) is on track to replace radar with a system that broadcasts GPS-based position data to controllers and other ADS-B-equipped aircraft as part of the NextGen system. Yet according to Haines–aka RenderMan–ADS-B signals are unauthenticated and unencrypted, and "spoofing" or inserting a fake aircraft into the ADS-B system is easy.

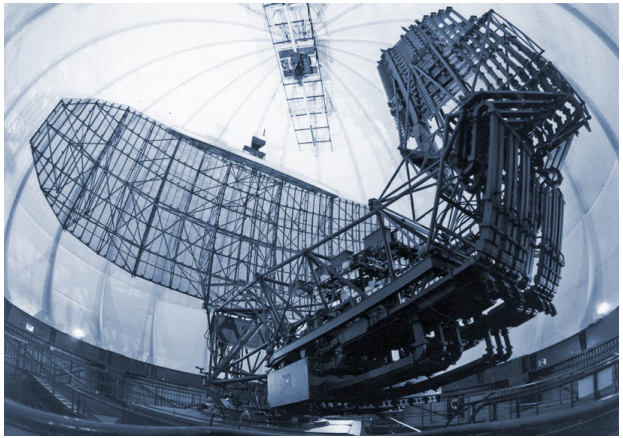
Haines and another hacker named Nick Foster demonstrated this by spoofing a fake aircraft into the simulated busy airspace over San Francisco, using the open source Flight Gear flight simulator program. Spoofing a target into the real ADS-B system would be a simple matter of transmitting the signal on the ADS-B frequencies (978 and 1090 MHz).

The FAA told **AIN** that the ADS-B system is secure. "We have ways of validating the data that shows up on a controller's screen so that spoofed targets are filtered out," an FAA spokeswoman said. "An FAA ADS-B security action plan identified and mitigated risks and monitors the progress of corrective action. These risks are security sensitive and are not publicly available. The air traffic system is based on redundancies to ensure safe operations. The FAA plans to maintain about half of the current network of secondary radars as a backup to ADS-B in the unlikely event it is needed."

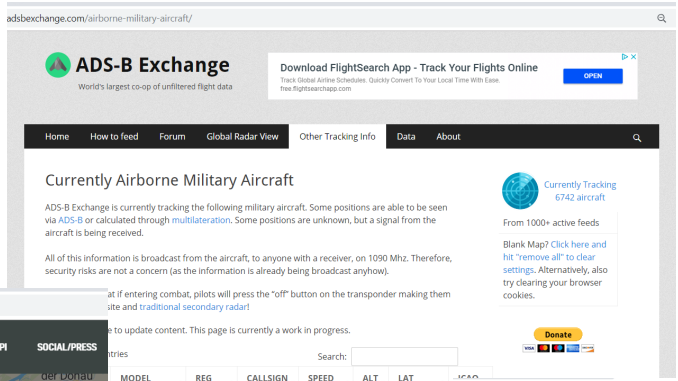
meaconing

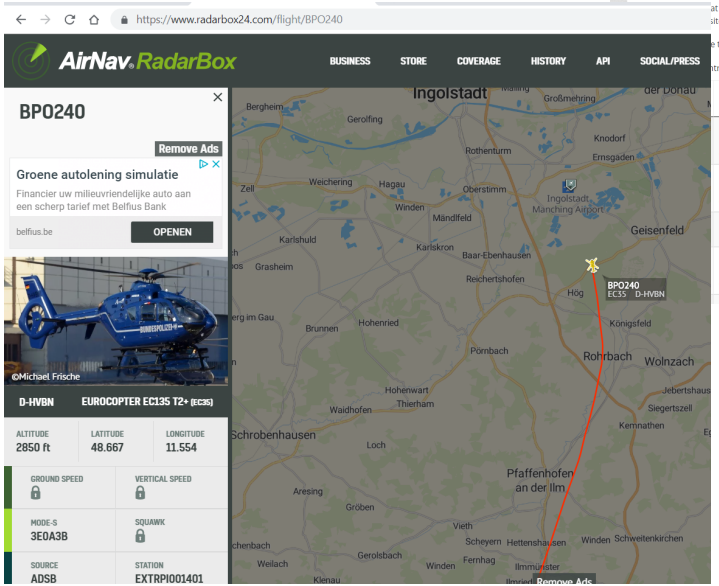
spoofing

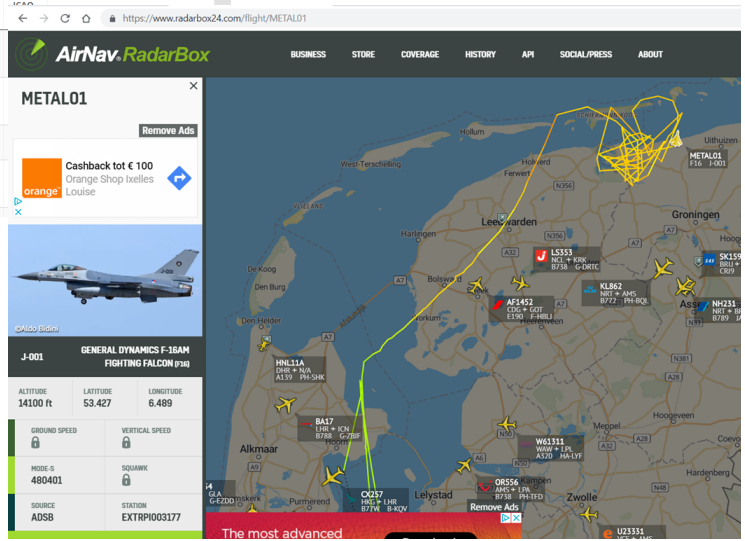
goofing



…and in the air







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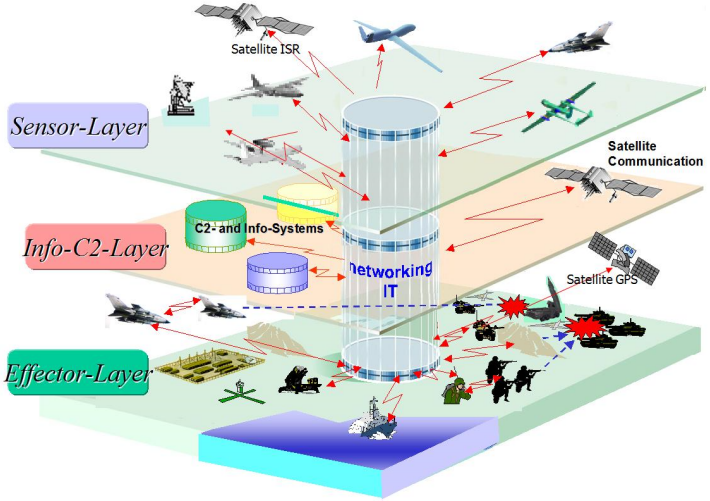
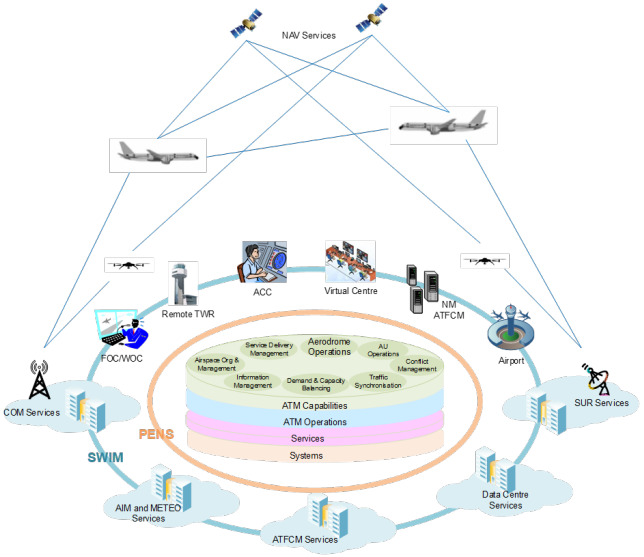
Interoperability is a must





Military crisis environment
Today - Core mission

SES environment
Tomorrow - Enabler

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Conclusion

- Let’s move forward together
- Civil-Military collaboration is key
  Interoperability is a must
- Defence and Security is a common responsibility

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???

Questions and Answers

Joint session