European Surveillance Strategy

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EUROCONTROL
Surveillance Domain Manager
The EUROCONTROL Organisation

The EUROCONTROL Agency

The Surveillance Strategy for ECAC

Single European Sky - Implementing Rules (IR)

Single European Sky ATM Research (SESAR)

Eurocontrol Products and Tools Strategy
EUROCONTROL is the European Organisation for the Safety of Air Navigation.

EUROCONTROL is a civil and military Organisation and has as its primary objective the development of a seamless, pan-European Air Traffic Management (ATM) system.
Currently, the EUROCONTROL Organisation has 37 Member States.

On 8 October 2002, the Member States and the European Community have signed a Protocol on the Accession of the European Community to EUROCONTROL.
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Eurocontrol Products and Tools Strategy
The EUROCONTROL Agency develops, coordinates and plans for implementation of short-, medium- and long-term pan-European air traffic management strategies for ECAC involving:

- national authorities,
- air navigation service providers,
- civil and military airspace users,
- airports,
- industry,
- professional organisations and
- relevant European institutions
The EUROCONTROL Agency is the “working organisation” of EUROCONTROL:

EUROCONTROL premises:
- Brussels (BE)
- Bretigny sur Orge (FR)
- Luxembourg (LUX)
- Maastricht (NL)
- Karlsruhe (DE)
- Prague (CZ)
- Budapest (HU)
European Air Traffic Management (EATM) Service Business Unit

Surveillance Seminar for the NAM/CAR/SAM Regions, 18-20 June 2007, Port of Spain, slide 8
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Eurocontrol Products and Tools Strategy
Updated in 2005

In cooperation with Stakeholders

It does not mandate the use of a particular surveillance technology or technique

Air Navigation Service Providers should select their systems based on:
  - Operational requirements
  - Cost Benefit assessment
  - Safety Assessment

Anticipating on “Required Surveillance Performance” (RSP)
The Surveillance Strategy for En-Route and TMA airspace is based on three specific Surveillance principals for ground based surveillance.

1. **Independent Non-cooperative surveillance**
   - to track non-cooperative targets that will be provided by Primary Surveillance Radar (PSR)

2. **Independent Cooperative surveillance**
   - to track cooperative targets that can be enabled by Secondary Surveillance Radar (SSR) or Mode S or (1090 MHz) Multilateration

3. **Dependent Cooperative surveillance**
   - based on Automatic Dependent Surveillance-Broadcast (ADS-B)
Within **En-Route and TMA airspace**, the key operational drivers for the surveillance strategy are illustrated in figure 1.

<table>
<thead>
<tr>
<th>Year</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td></td>
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<tr>
<td>Increased support to the controller's ATM Tools like STCA and MSAW</td>
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<td>Improved Medium Term Conflict Detection</td>
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<tr>
<td>ASAS Air Traffic Situation Awareness</td>
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<tr>
<td>Spacing and Separation applications</td>
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<tr>
<td>Air-to-air exchange of trajectory information</td>
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</tbody>
</table>

**Purpose / Applications:**

- Independent surveillance for non co-operative targets in TMA airspace
- Short Term Conflict Alert
- Minimum Safe Altitude Warning
- Downlink of trajectory change points
- Traffic situation picture presentation to Aircrew
- Traffic information presentation to Aircrew

*Figure 1. Key Operational Drivers for En-Route and TMA Surveillance Strategy*
The strategy for the ground based surveillance infrastructure to enable the ATM operational En-Route and TMA applications over the next twenty years is illustrated in figure 2.

Figure 2. Ground based surveillance infrastructure for En-Route and TMA
At **Airports**, the key operational drivers for the surveillance strategy are illustrated in figure 3.

- **2005**
  - Detection of all mobiles including non co-operative
  - Presentation of Airport information to aircrew

- **2010**
  - Detection of co-operative targets and automatic extraction of aircraft identification

- **2015**
  - Automated Conflict Detection
  - Conflict prediction tools for the aircrew

- **2020**
  - Purpose / Applications:
    - A-SMGCS level I and II, including Package 1 ADS-B-APT
    - A-SMGCS level II
    - A-SMGCS level III, including Package 1 ATSA-SURF
    - A-SMGCS level III and IV

*Figure 3. Key Operational Drivers for Airport Surveillance Strategy*
The strategy for the **Airport surveillance infrastructure** to enable the ATM applications over the next twenty years is illustrated in figure 4.

![Figure 4. Surveillance Strategy at the Aerodrome](image)

- **Surface Movement (Primary) Radar**
- 
  - (Airport) Multilateration and/or ADS-B using 1090 MHz (Extended Squitter) or another data link
- 
  - TIS-B Services
- 
  - (Airport) Multilateration and/or ADS-B using 1090 MHZ (Extended Squitter) or another data link
- **Surveillance Data Processing and Distribution**

**Purpose / Applications:**

- A-SMGCS level I and II (including Package 1 ADS-B-APT)
- A-SMGCS level III and IV (including Package 1 ATSA-SURF)
The strategy for the **Airborne surveillance infrastructure** to enable the ATM applications over the next twenty years is illustrated in figure 5.

**Figure 5. Airborne Surveillance Strategy**

- **2005**: SSR Mode S and ADS-B out
- **2010**: ADS-B in + TIS-B + CDTI
- **2015**: Surveillance Data Processing / Air Situation Picture
- **2020**: Purpose / Applications:
  - Ground surveillance: Mode S or Multi-Lateration and ADS-B package I
  - ASAS Separation
  - ADS-B Packages 2 & 3
## Status of En-Route/TMA Surveillance deployments in ECAC

<table>
<thead>
<tr>
<th>Primary Surveillance Radar</th>
<th>Widely deployed in “major” TMA’s Also En-Route (like UK, DE)</th>
<th>Total about 100 PSR’s combined with SSR (Mode-S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary Surveillance Radar</td>
<td>Widely deployed in En-Rout and TMA</td>
<td>More then 300 civil SSR + Mode-S radars</td>
</tr>
<tr>
<td>SSR Mode-S</td>
<td>Widely deployed in “core area” of Europe and beyond</td>
<td>Currently more then 100 Mode-S radars (most civil but some military)</td>
</tr>
<tr>
<td>Wide Area Multilateration</td>
<td>Implementation and deployment is accelerating in Europe</td>
<td>In 2 States operationally used for ATC services More planned in next years</td>
</tr>
<tr>
<td>ADS-B “out” ground surveillance</td>
<td>Local deployment in Non Radar Areas, validation on going</td>
<td>Operationally in Sweden with VDL Mode4</td>
</tr>
</tbody>
</table>
Content

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Eurocontrol Products and Tools Strategy
Single European Sky – Implementing Rule (SES IR)

- High Level requirements that becomes a law in the European Community States
- (Interoperability) Implementing Rules can be supported by “Community Specifications”
- Two Surveillance SES Implementing Rules in preparation

- Mode S Interrogator Code Allocation
- Surveillance Performance and Interoperability
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The objectives of the SESAR programme, a joint initiative of EUROCONTROL and the European Commission, are to eliminate the fragmented approach to ATM, transform the European ATM system, synchronise the plans and actions of the different partners and federate resources.

SESAR will be run in three major phases:
- Definition Phase (2005-2008)
- Development Phase (2008-2013)
- Deployment Phase (2014-2020)

The SESAR Definition Phase was officially launched on November 17th 2005.
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Eurocontrol Products and Tools Strategy
EUROCONTROL develops and maintains a number of Products and Tools which can be categorised as follows:

- for **ATM operational use**;
- to **assess operational systems** or new surveillance concepts or techniques;
- to support EUROCONTROL Programmes or Domain activities.

The objective of the surveillance products and tools strategy is to define an evolutionary path such that the surveillance system evolution outlined in the Surveillance Strategy for ECAC can be achieved in a timely manner.
The Surveillance Products and Tools Strategy includes ARTAS, RMCDE and SASS-C that are complementary products, designed to operate in the same Surveillance environment.
Some EUROCONTROL Products and Tools that are subject of this Strategy:

- Radar
- Message Conversion & Distribution Equipment

- Network node for surveillance data distribution networks
- Surveillance data front-end processor and distribution system in an ATS Unit environment
Some EUROCONTROL Products and Tools that are subject of this Strategy:

- ATM
- surveillance Tracker
- And
- Server

- Europe-wide distributed Surveillance Data Processing System
Surveillance Products & Tools Strategy 5/7

- Surveillance
- Products
- & Tools
- Strategy

Sensor Configuration Planning

Track Surveillance Data Evaluation

SASS-C

Sensor performance analysis

Surveillance Data Evaluation

Track analysis

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Some EUROCONTROL Products and Tools that are subject of this Strategy:

**Surveillance**

**Analysis**

**Support**

**System for Centre**

**SASS-C Toolbox:**

**MAS** Multi Source Acquisition Suite
**TRES** Trajectory Reconstruction and Evaluation Suite
**SMART** Simulator for Multi-radar Analysis of Realistic Traffic
**RASCAL** RAdar Sharing CALculation
**CAPT** Coverage Analysis and Planning Tool
Surveillance Analysis Support System for Centre are widespread used in Europe for:

- **Multi-Sensor Surveillance performance analysis using opportunity traffic**
  - Surveillance Data Acquisition
  - Assessment of performance of sensors and trackers

- **Sensor Configuration Planning tools**
  - Coverage and screening computation

- **Simulation tool**
  - Simulation of Traffic and Surveillance data (all sensors)
Questions

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If you are interested
How to get EUROCONTROL Products or Tools

EUROCONTROL policy:

- The Surveillance Products and Tools are made available to third parties **free of charge for their own and non-commercial** purposes (subject of an Agreement)
- Required equipment and Commercial Of The Shelf (COTS) licences have to be procured by the third party
- **No EUROCONTROL services** will be provided outside the ECAC area

**SASS-S** Surveillance Analysis System and Support for Sensors

is an ‘indicative’ toolkit for validation of surveillance sensors. SASS-S is a commercially available toolkit.