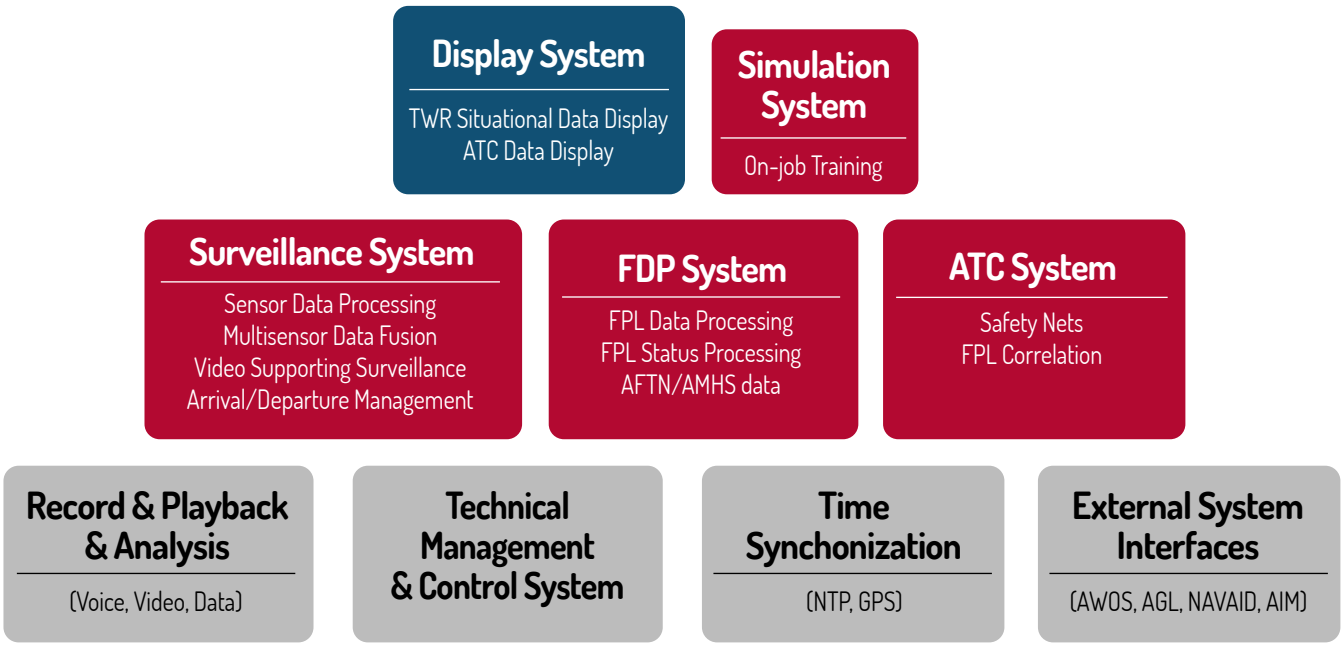
ERIS-A
AIRPORT ATC SYSTEM

ERIS-A: A-SMGCS SYSTEM

ERIS-A belongs to a family of advanced airport surveillance data processing and display systems designed for air traffic control and flight planning operations in TMA and airport, and developed in compliance with ICAO 9830-AN/452 and EUROCONTROL SPEC-171, EUROCAE ED-87, -109.

ERIS-A, generating surveillance and aeronautical data, is designed to support air traffic control within the Remote Tower concept as well.



KEY FEATURES:

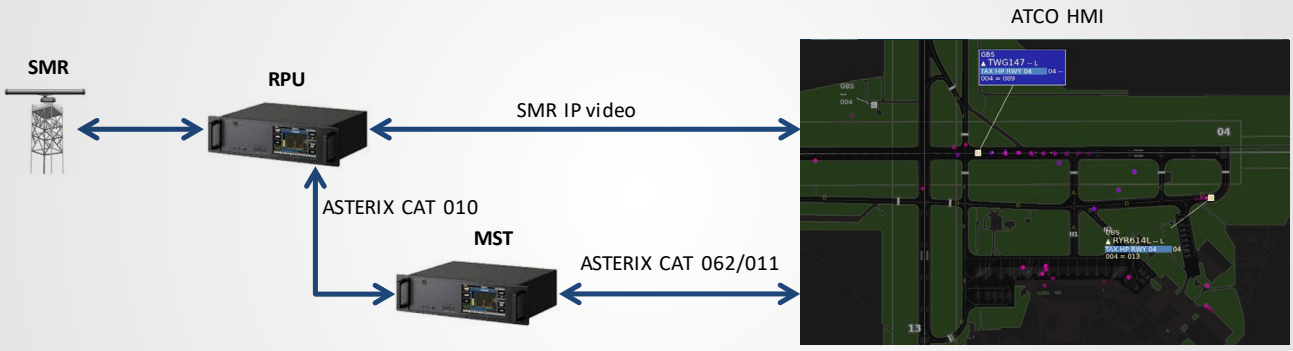
- Open and modular architecture
- Surveillance Data Fusion from various data sources (ADS-B, MLAT, SMR, TAR)I
- Provision of Surveillance Monitoring Service and Airport Safety Support Service (RMCA, CATC, CMAC)
- Integrated Electronic Flight Progress Strip (EFS) module for a control and presentation of flight progress
- Comprehensive supervision and monitoring system
- Continuous operational data recording, archiving and replay system
- Configurable HMI at ATCO working positions
- Supporting data for airside security awareness and Airport Management
- Airport Map Layout editor as a part of delivery

ERIS-A: A-SMGCS SYSTEM

Data Processing Modules

ERIS RPU — Radar Processing unit is responsible for

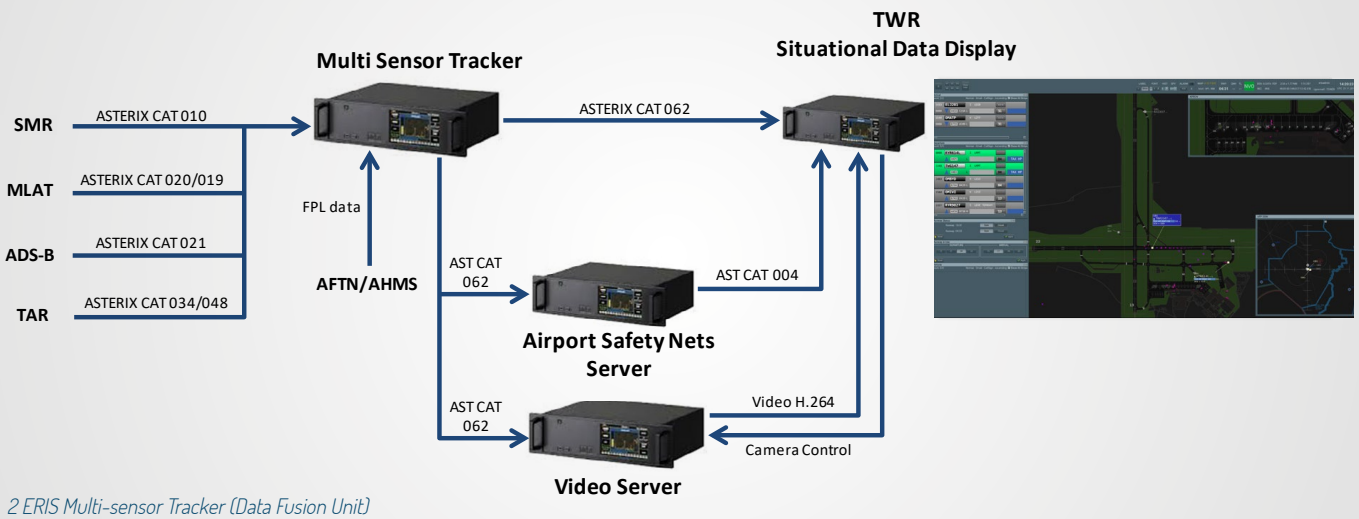
- Surveillance movement radar (SMR) raw data processing, plot extraction and track processing
- Detection and tracking of non-cooperative target movements on the RWYs and TWYs
- Distribution of SMR video and plots/tracks in ASTERIX CAT 010 format within ERIS network



1 ERIS SMR Radar Processing

ERIS MST — Multi-Sensor Tracker is the key element of the ERIS system performing the following tasks:

- Gathering and decoding data from different surveillance data sources (PSR/MSSR, MLAT, ADS B, SMR) and forwarding them for further processing
- Creating and maintaining system tracks by fusing heterogenous surveillance data sources
- Providing surveillance information within the configurable Area of Interest
- Providing system tracks within ERIS network



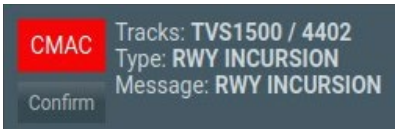
2 ERIS Multi-sensor Tracker (Data Fusion Unit)

ERIS-A: A-SMGCS SYSTEM

Safety Net Module

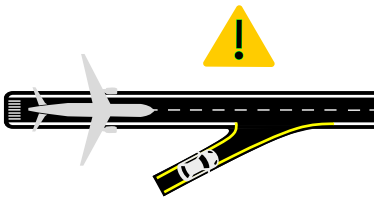
is designed to perform the following tasks:

- **Runway Monitoring and Conflict Alerting (RMCA)** – automatic generation of warnings and alerts in case of a potential short-term collision to mitigate safety risks caused by incursion of airport operational areas and/or loss of separation minima between mobiles. The Alert reports provided in ASTERIX CAT 004.
- **Indicating Conflicting ATC Clearances (CATC)** – providing the controller with a set of predictive clearances and indicating conflicting clearances via **HMI-Electronic clearances**.
- **Providing Conformance Monitoring Alerts for Controllers (CMAC)** – issuance of warnings upon ground movements of aircraft and vehicles of which paths and behaviour deviate from issued clearances.
- **Providing Arrival and Departure List** – aircraft take-off/landing monitoring to improve ATCO's situational awareness during low visibility operation and/or unbalanced increase of traffic density.



Airport Safety Nets contribute to the safety aspect of airside operation, enabling Controllers to prevent hazards/incidents resulting from Controller, Flight Crew or Vehicle Driver operational errors or deviations.

EXAMPLES OF CALCULATED ALERTS:



LIST OF CALCULATED RMCA:

- Approaching/Arriving aircraft – Obstacle on RWY
- Departing aircraft – Crossing Incursion in restricted area
- Stop bar/Holding point crossed
- Vehicle on RWY or Safety strip
- Arrival to/Departure from wrong RWY
- Arrival/Departure Opposite Traffic Alert
- Arriving and Departing aircraft on intersecting RWY

LIST OF CALCULATED CMAC:

- No Push-back, No Start-up approval
- No Taxi approval
- Lining up on wrong RWY
- Landing on wrong RWY

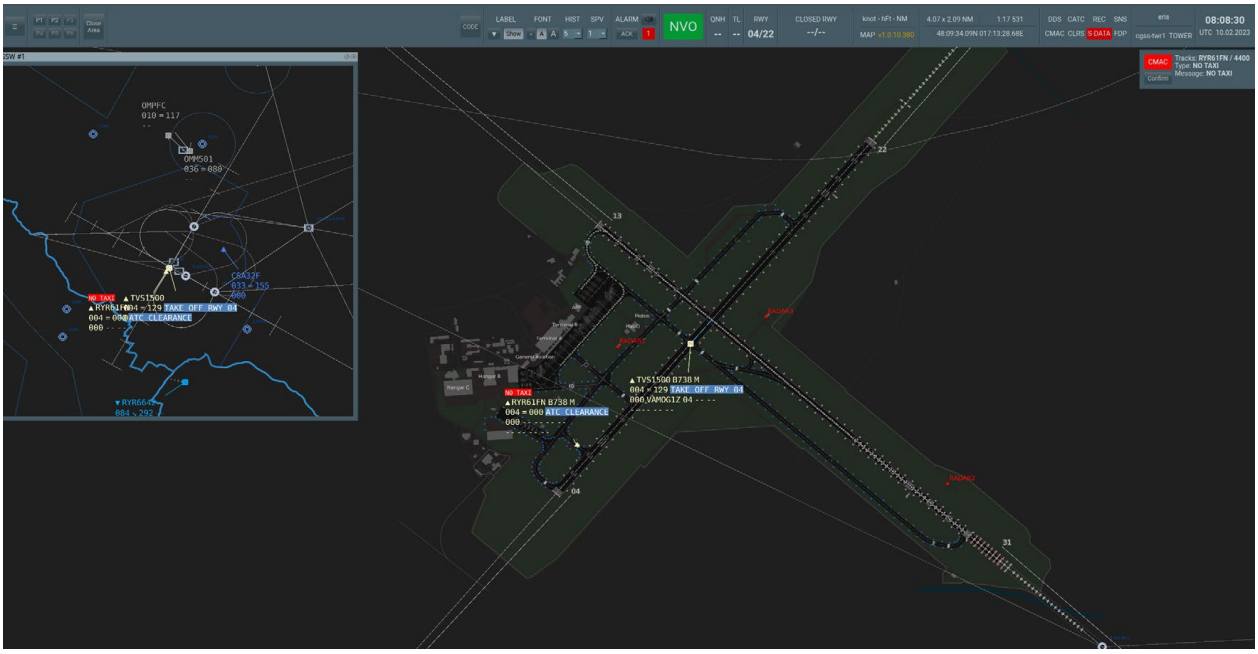
LIST OF CALCULATED CATC:

- Line Up vs Take off
- Take off vs Line Up
- Line Up vs Landing
- Landing vs Line Up
- Crossing/Entering RWY vs Take off
- Entering RWY vs Closed RWY

ERIS-A: A-SMGCS SYSTEM

Display Modules

ATCO display HMI was developed in close cooperation with controllers as a multiuser system meaning all activities at any CWP and processing results appear at all other CWPs without any latency. CWS app can run in a single- or dual-monitor configuration while providing the same functions. In a dual-monitor configuration, the main screen is used to display surveillance and SafetyNet information while providing the controller with a clear picture of movements on approach and on the airport surface and the second screen serves for a display of EFS assisting users in managing traffic workflows safely and efficiently on the ground and on approach.

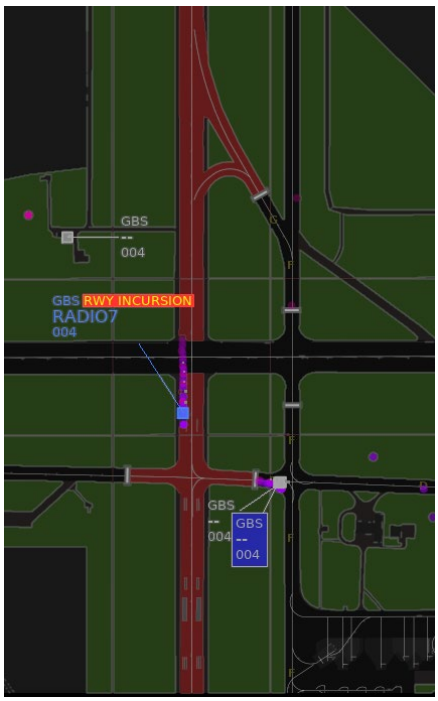


In a single-monitor configuration, both the surveillance functions and **EFS** system are manipulated via one screen whereby specific groups of strips are managed through windows laying on top of the main primary CWS window.

EFS module provides the user with a set of customized **predictive clearances** to be issued with respect to operational and safety aspects, local rules, and applied to a specific phase/type of flight or flight operation.

User profile management provides access control based on rules specified by the user. Map view profile management allows to apply user-specific settings to create customized configurations of map content which the user needs when accomplishing his specific tasks.

Safety Nets Alerts and Clearance Inputs are displayed in the target label and electronic flight strip

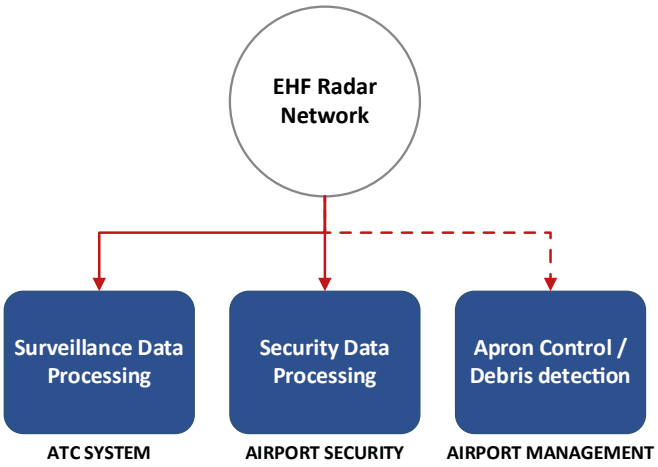


ERIS-A: ALTERNATIVE AIRPORT SURVEILLANCE SUBSYSTEM

Surveillance subsystem is an integral part of ERIS-A solution. ERIS can be integrated with standard SMR radar via ASTERIX CAT 10 output, however R-SYS introduced an optional cost-effective solution in accordance with upcoming **A-SMGCS Light** concept. This solution uses Extra High Frequency (EHF), FMCW, low consumption very short range radar for a detection of non-cooperative targets combined with ADS-B or MLAT system. Such system can significantly improve a safety at reduced costs for an acquisition of non-cooperative target detection system intended for regional and/or middle-sized airports. EHF radar network (ENR) and advanced SW processing system utilizing AI elements which provide key information on targets - position, size, speed, direction, and characteristics.

CGSS PROVIDES:

- Cost effective coverage of airport areas capable of competing with conventional X-band radar systems
- Reliable solution for operation in all weather conditions while running at very low power consumption (<20 W) and reduced maintenance costs
- Surveillance information that can effectively support the video system within Remote TWR concept
- Solution supplemented by automatically controlled PTZ cameras to provide a video of occurring conflict situation. This can be recorded by the video cameras and sent to a control centre for on-line monitoring .

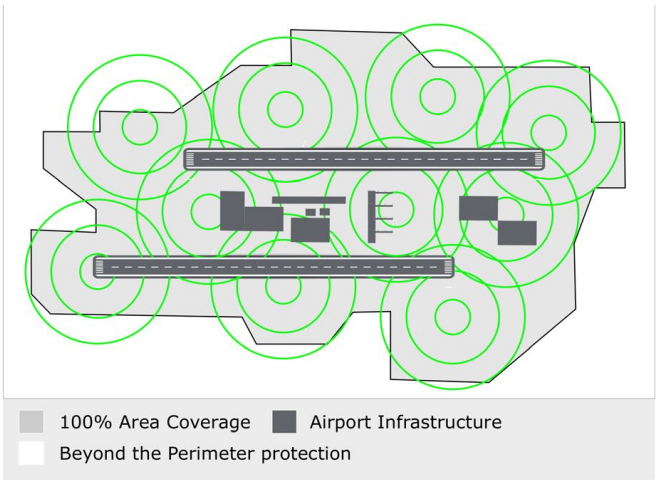


3 CGSS Multi-mission system - can concurrently be used for various purposes

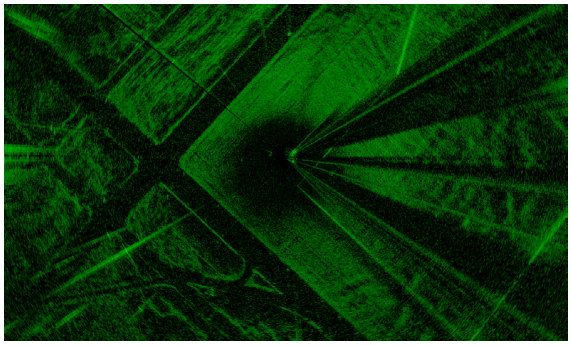
EHF is a short-range radar providing high-precision measurement of a target position. It can be used as a principal source of non-cooperative target data or as a gap filler radar ensuring a coverage of blind zones. EHF radars are sources of sufficient data needed for a calculation of potential collisions caused by runway incursion.

10 EHF Radar installations

In partnership with NAVTECH RADAR



4 EHF radar network. The number of radars and their deployment depend on the geographical conditions of the controlled airport area.



5 Raw EHF radar video.

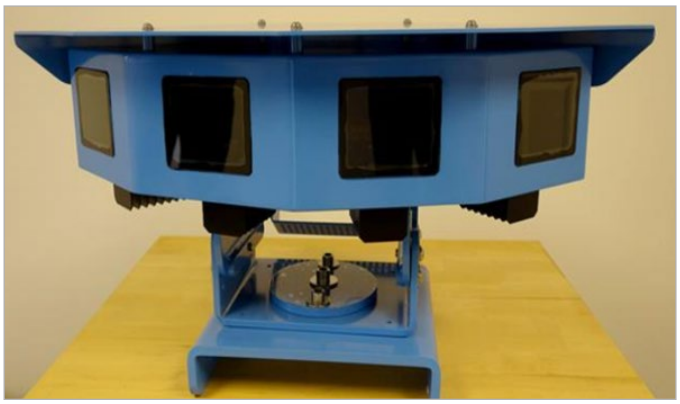
EHF radar frequency band	FMCW - 76-77.5 GHz
Scalable detection range	Scalable range 800- 3000 m Vehicle detection up to 2000 m Human detection up to 900 m
Resolution	25 cm
Radar pattern	Azimuth 1°, Elevation 3°
Data update	360° up to 1 sec)
Consumption	18 W
Weight	17 kg

ERIS-A: VIDEO SURVEILLANCE SYSTEM

The role of **Video Surveillance System (VSS)** is to control the camera system, process video and distribute the picture gathered by the camera system.

VSS as a source of video information provides supplementary surveillance information to facilitate a target identification while contributing to airport traffic safety and eliminating false alerts and/or false targets within the system-controlled area.

Controlled traffic video supports ATC by shortening ATCO response time in case of safety warnings, and by reducing false alarm rate and providing additional identification of object in conflict.



8 Panoramic Camera

7 PTZ Camera

9 Augmented video - Labeled target in video display

6 EHF Radar installation

VSS KEY FUNCTIONS:

- ASTERIX CAT 062, CAT 011 processing
- Follow Up Target, Follow Up Target in Conflict, Look At [position]
- Picture-from-picture (PfPi)
- Combination of Fix, Hot-Spot and PTZ cameras
- Video Stream Recording
- Surveillance Video Wall and Video Clients on ATCO CWPs

ERIS-A: INTEROPERABILITY WITH CONCEPTS AND LEGISLATIVE

ICAO DOC 9830-AN/452

Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual, First Edition – 2004

EUROCAE ED-87

Minimum Aviation System Performance Specification For Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Levels 1 And 2

EUROCAE ED-116

Minimum Operational Performance Specification for Surface Movement Radar sensor systems for use in advanced surface movement guidance and Control systems (A-SMGCS)

EUROCAE ED-109

Software Integrity Assurance Considerations for Communication, Navigation, Surveillance and Air Traffic Management (CNS/ATM) Systems

EUROCONTROL SPEC-171

Specification for Advanced Surface Movement Guidance and Control System (A-SMGCS) Services

SESAR PROJECTS PJ03B

SESAR 2020 Safety Nets for Airport with Limited Surveillance Capability

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