



ATM Surveillance Data Display, Distribution, Processing

Eighth Eastern Caribbean Network Technical Group (E/CAR/NTG/8), Sixth Eastern Caribbean Radar Data Sharing Ad hoc Group (E/CAR/RD/6), and Fourth Eastern Caribbean Civil Aviation Technical Group (E/CAR/CATG/4) Meetings
Saint George's, Grenada, 3 - 7 September 2018

FREQUENTIS
COMSOFT



FREQUENTIS

FOR A SAFER WORLD

ATM Surveillance Data Display, Distribution, Processing

Eighth Eastern Caribbean Network Technical Group
(E/CAR/NTG/8) Meeting,
Sixth Eastern Caribbean Radar Data Sharing Ad hoc
Group (E/CAR/RD/6) Meeting,
Fourth Eastern Caribbean Civil Aviation Technical Group
(E/CAR/CATG/4) Meeting

Saint George's, Grenada, 3 - 7 September 2018

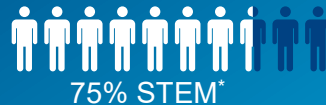
Frequentis group 2017

Global market leader



275 M EUR
Total operating
performance 2017*

1,697
Employees



12%
R&D

Headquarters Vienna



95%
Export

Solutions partners and regional offices in 50+ countries

1947
Established



FREQUENTIS COMSOFT

#1

Market leader
in AMHS

300+

ADS-B/MLAT receiver units
sold worldwide

1989

A pioneering role in surveillance
communication since 1989

Located in
a high tech
region of
Germany



80

Installed base in
over 80 countries

FREQUENTIS

A member of the Frequentis
group since January 2016

200

employees
from diverse cultures

70%

of our staff
hold university degrees



: A Glance at the Frequentis Surveillance, Messaging, and AIM History

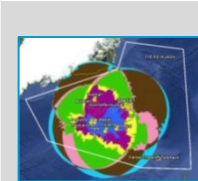
Entering the ATC market with a contract for European Surveillance Network RADNET on behalf of EUROCONTROL



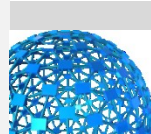
RAPS product is qualified as **ASTERIX Reference & Test Tool**



Industrial Partner of **EUROCONTROL** for Centralised ARTAS Maintenance and Support (CAMOS) until today



New Generation of COMSOFT's **Surveillance Data Distribution System**



FREQUENTIS
We become a member of the **Frequentis Group**

Comsoft Solutions will be known as **FREQUENTIS COMSOFT**

1989

1997

1998

2001

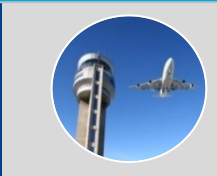
2006

2007

2012

2016

2018



Our **AMHS solution** selected as candidate for European Communication Gateway



Thanks to **Quadrant ISAVIA** is the first European ANSP to provide air traffic control **based on ADS-B**

Undisputed AMHS market leader: our solutions are involved in virtually all AMHS connections worldwide



ATM Solutions for a Safer World

ATC Tower	Remote Tower	ATC Control Centre	ATM Grade Networks	Information Management
Tower Solutions	Tower Solutions	Voice Communication	Network Nodes and Gateways	AIM
Voice Communication	Virtual Tower	Recording	Network Management	Messaging
Recording	Recording	ATM Components	Intelligent Networks	
Air Situation Display	Air Situation Display		Recording	AIM DB & TOOLS
Tracking	Tracking	Tracking ARTAS	Satellite services	AMHS
Surveillance ADS-B, MLAT, Distribution, Recording	Surveillance ADS-B, MLAT, Distribution, Recording	Surveillance ADS-B, MLAT, Distribution, Recording	Surveillance Data Distribution	
Messaging	Messaging	Messaging		

Surveillance data and VSAT networks

End-to-end network performance

Surveillance data processing and tracking

Improved situational awareness

WAM and ADS-B surveillance technology in ATM

Innovation and cost-optimisation

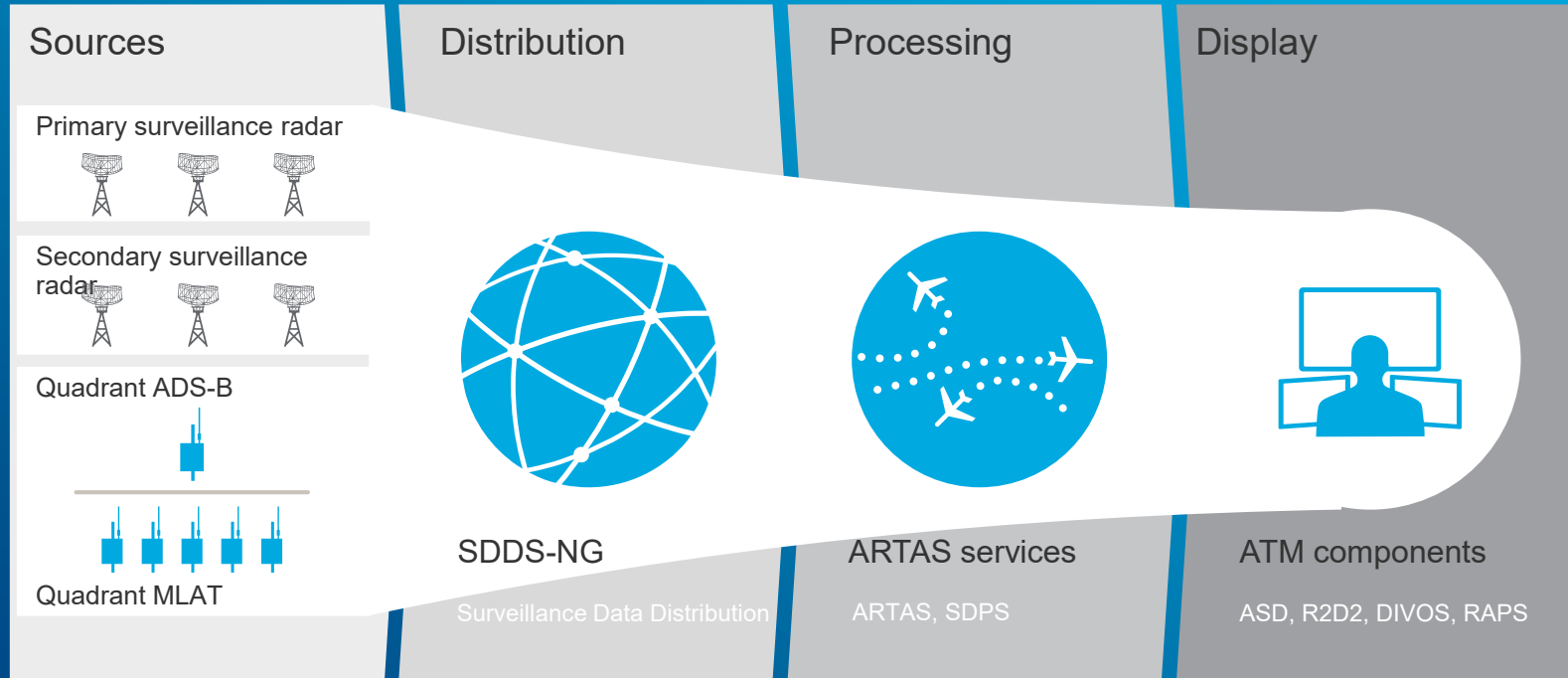
Market leadership in AIM and message handling

Tailored solutions for any deployment

Surveillance ASD



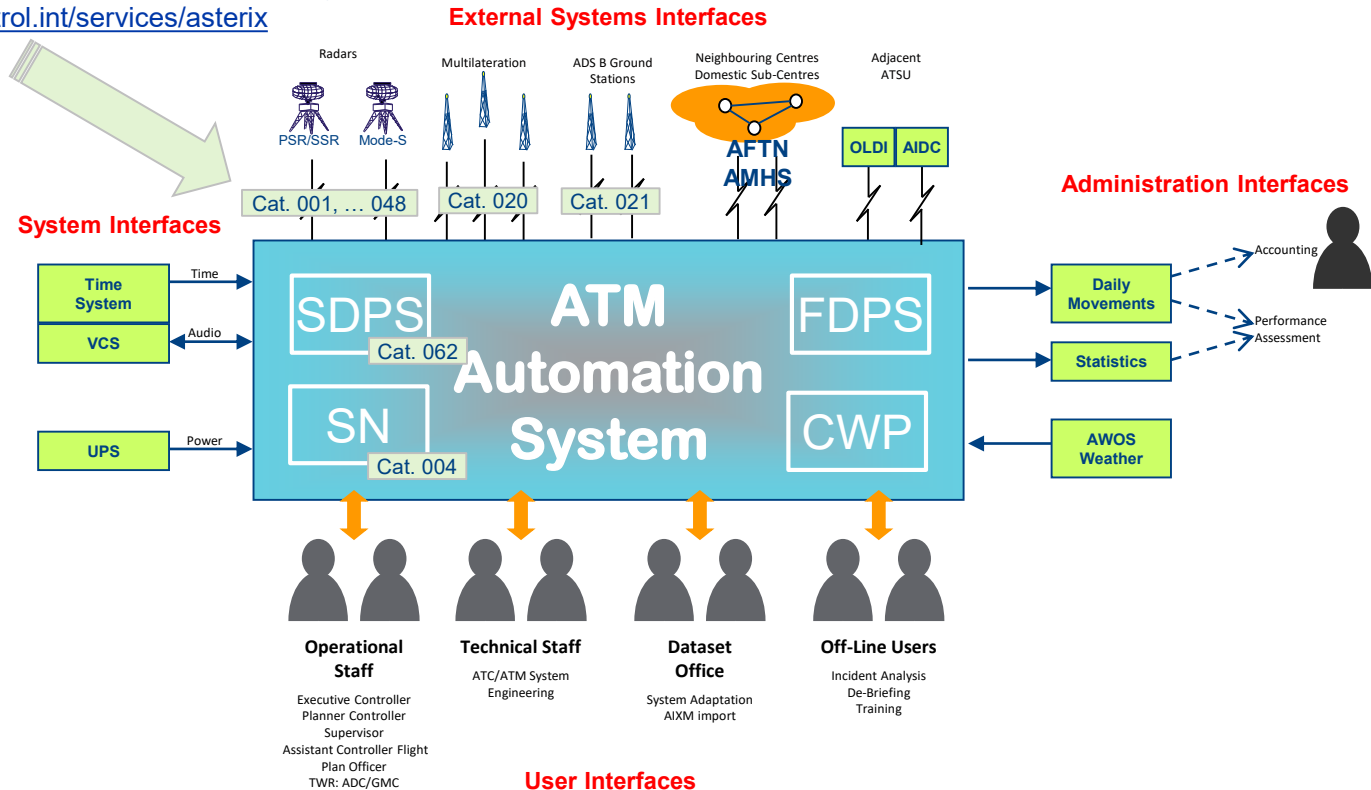
Open standard interfaces throughout the complete surveillance chain



Open Standard Interfaces throughout the Complete Surveillance Chain

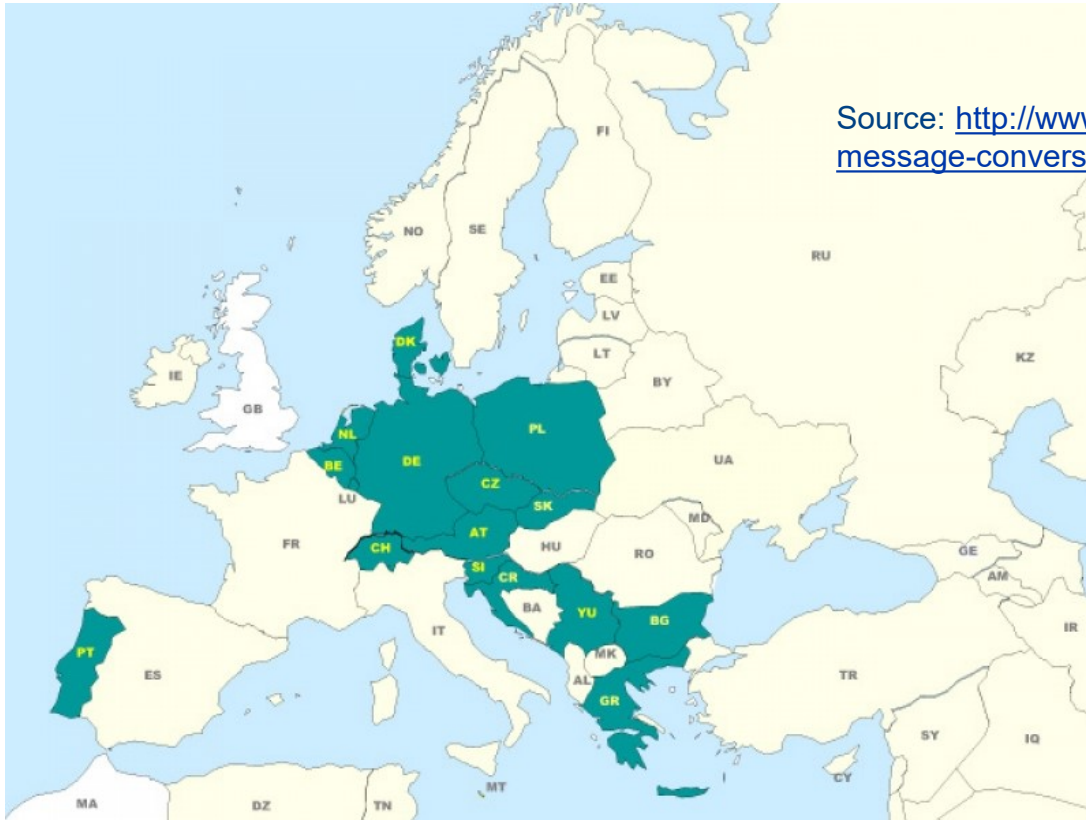
ATM System

All-purpose STructured Eurocontrol suRveillance Information eXchange
<http://www.eurocontrol.int/services/asterix>



Open Standard Interfaces throughout the Complete Surveillance Chain

Share and Distribute Data

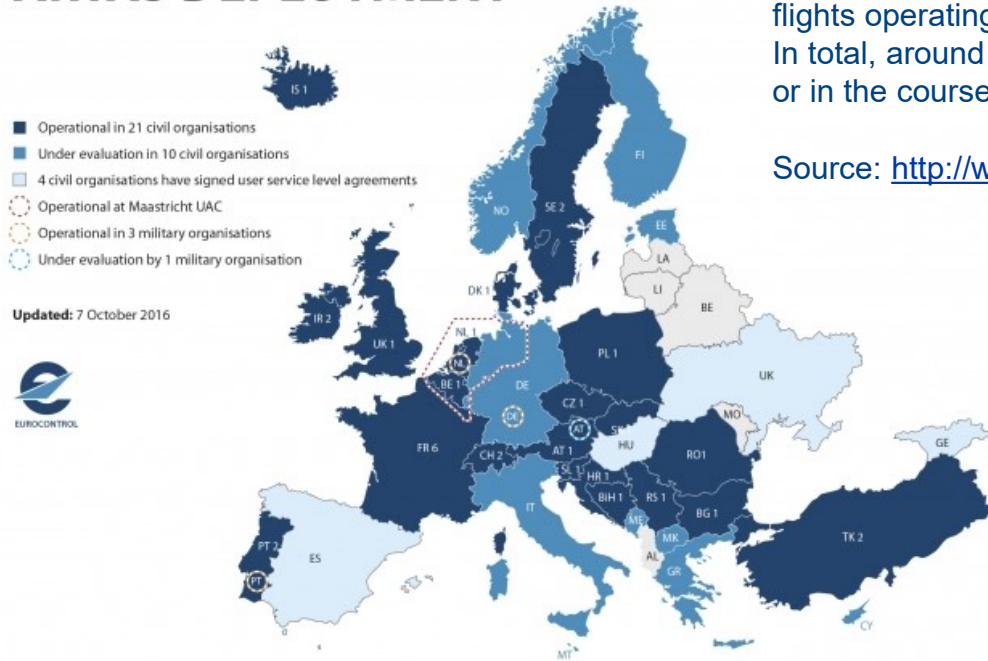


Source: <http://www.eurocontrol.int/services/surveillance-message-conversion-and-distribution-equipment-rmcde>

Open Standard Interfaces throughout the Complete Surveillance Chain

Experience and Trusted, Stable Code Base

ARTAS DEPLOYMENT

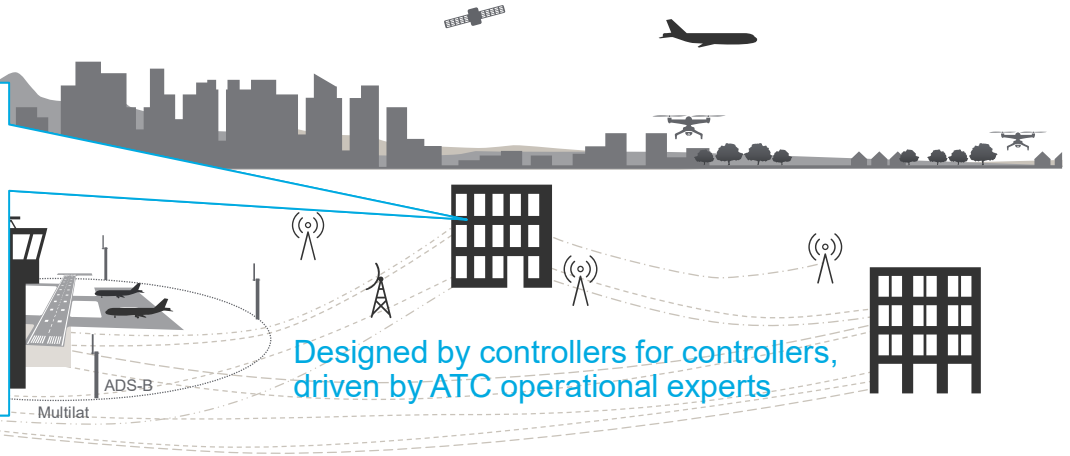


“Today ARTAS tracks close to 80 % of European daily flights operating at 31 ATC Centres in 40 European states. In total, around 100 ARTAS units are currently implemented or in the course of implementation.”

Source: <http://www.eurocontrol.int/artas>

Air Situation Display – providing ATM automation from ground to en-route

Scalable solution based on extensive experience in advanced air traffic automation systems



Fully expandable and modular

system designed to add functionality (Buy-as-you-grow)

Flexible configuration

for tower-, approach- and en-route application

Plug & Play installation

of legacy and new technologies into state-of-the-art surveillance networks

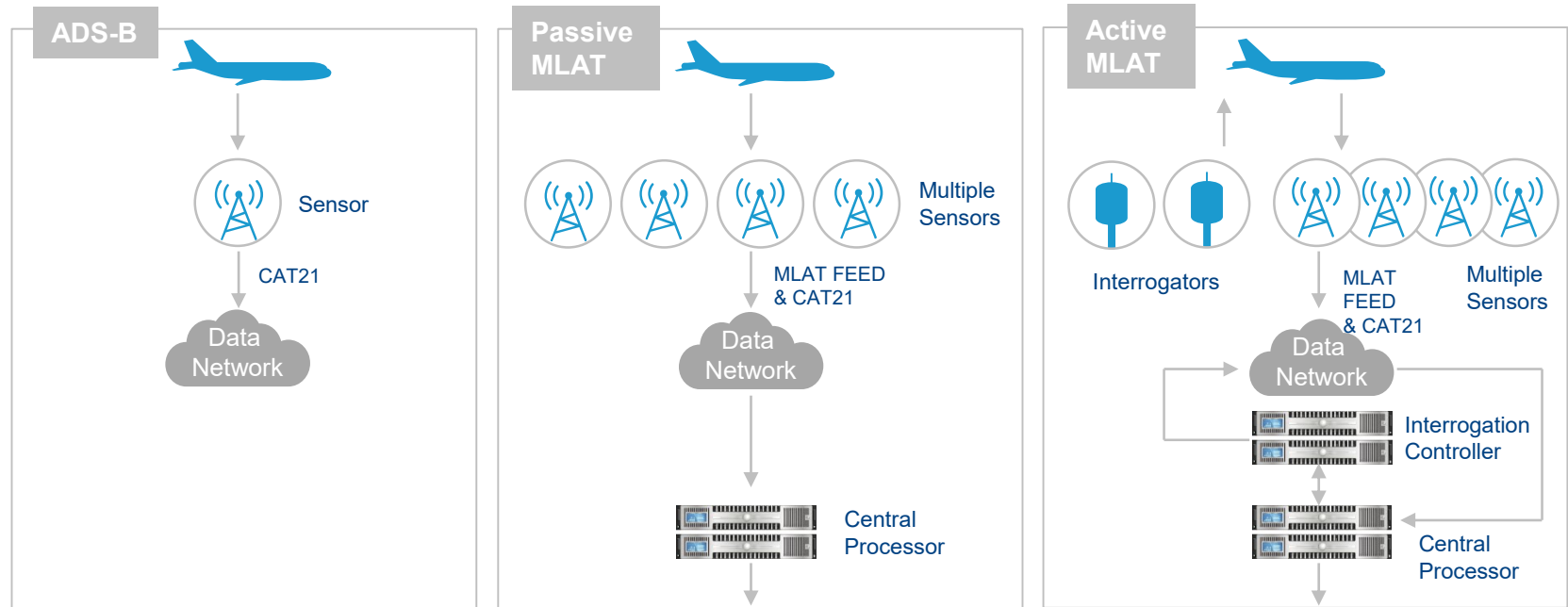
Throughput & safety

Enhanced traffic planning
Optimised traffic throughput
Enhanced traffic awareness

SafetyNet

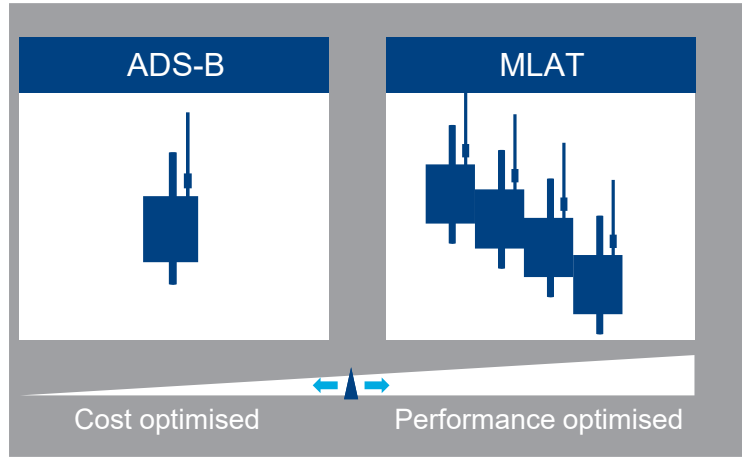
For visual and acoustic warnings and alarms

Surveillance Sources: Quadrant ADS-B & Multilateration

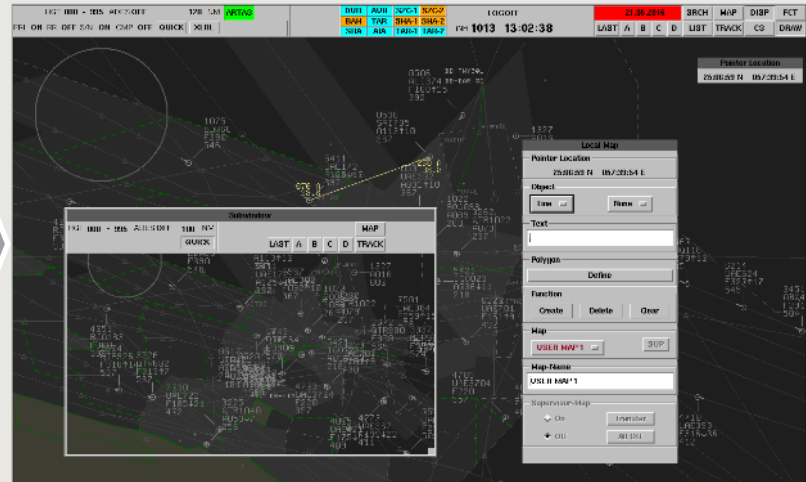


ASD for small and mid-size tower environments

Scalable solution concept – adaptable for different use cases, designed to cost



Main Surveillance Display



Use cases

- Small approach units
- Military and civil applications
- Gap filling (Radar outage)

Throughput and safety

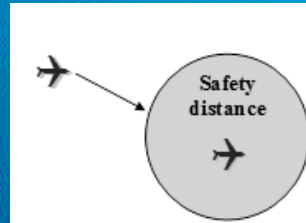
- Assists visual identification
- Optimized traffic throughput
- Enhanced traffic awareness

Optimum trade-off between in-time conflict prediction and unessential alert rate

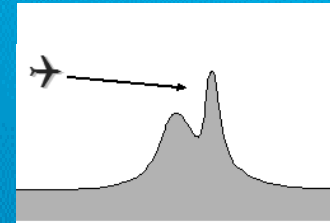
Optional ASD Module: Safety Nets

Short Term Conflict Alert

Detection of a potential or actual separation minima infringement between aircraft



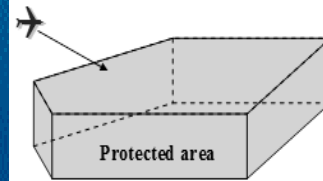
STCA Conflict Situation



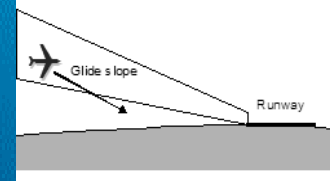
MSAW Conflict Situation

Approach Path Monitor

Detection of the increased risk of CFIT accidents during final approach (integrated in MSAW)



APW Conflict Situation



APM Conflict Situation

Minimum Safe Altitude Warning

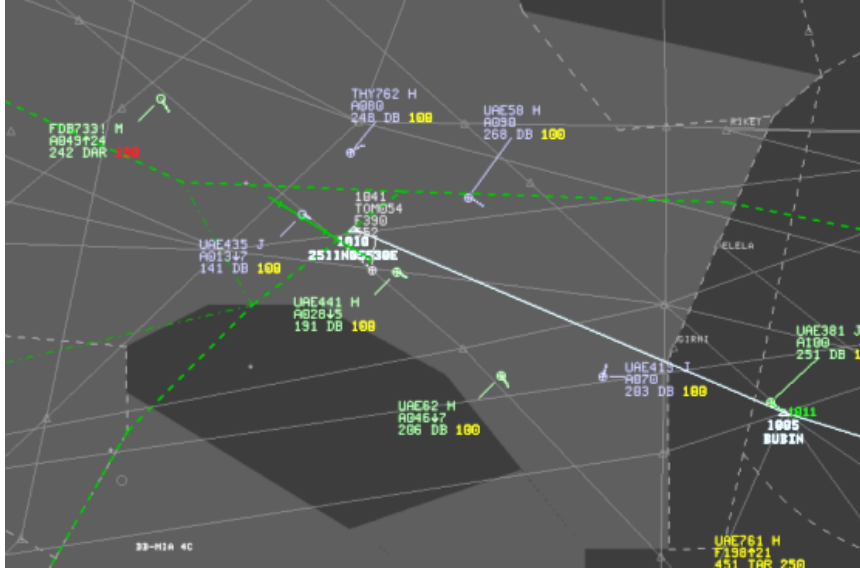
Detection of a potential violation of minimum safe altitude above terrain or obstacles to avoid controlled flight into terrain (CFIT) accidents

Area Proximity Warning

Detection of a potential or actual infringement of a required spacing to an airspace volume

GCAA, Abu Dhabi | First operational AMAN in the Middle East region

Reference surveillance displays



Pairing of surveillance data with up-to-date flight plans and presentation as integrated information to the ATCO



Complete ATM Automation System including Arrival Management (AMAN), Departure Flow Management and SafetyNets

Location: Sheikh Zayed Centre, Abu Dhabi



Armasuisse | ASR and PSR display system for approach control system

Reference surveillance displays at military airfields



5 military airfields
in Switzerland



IF to airport
surveillance
radars (ASR)
and precision
approach radars
(PAR)

Integration of
working
positions into the
existing ATC and
recording
environment

Additional
support and
analysis options
through flexible
recording system
R2D2



ATM Display Solutions

ASD

Air Situation Display
providing seamless
air/ground awareness
for Air Traffic Controllers



Remote Tower
Vital part of the
FRQ group
remote tower
solution



Highlights

- **Modular system design:** enabling optional functionality such as Short Term Conflict Alerts (STCA), Area Proximity Warnings (APW) and Minimum Safe Altitude Warnings (MSAW)
- **SafetyNet:** displaying a prominent visual warning and graphical representation of the conflicts
- **Flight Plan Database:** matching data against current aircraft tracks, using their call sign, Mode S address or Mode 3/A code
- **Tools & applications:** can be used for TWR, APP and ACC applications

User Benefits

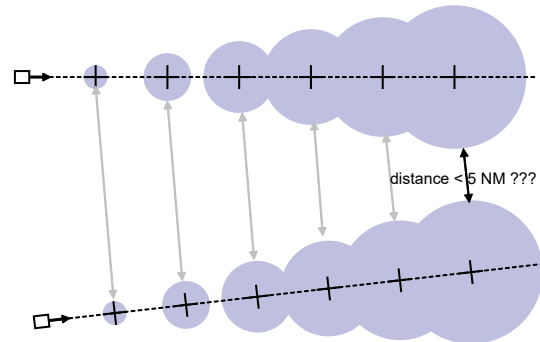
- **Early operational readiness:** Plug & Play installation
- **From controllers for controllers:** Based on extensive experience in advanced air traffic automation systems
- **Buy-as-you-grow:** Fully expandable and modular system design to add functionality
- **Adaptable to different use cases:** Flexible configuration for tower-, approach- and en-route applications

Separation Tools Time Line

	0 – 60s	0 – 120s	10 – X	10 – X	60 - X
Name	TCAS	STCA	VERA	MIN SEP	MTCD
Primary Information Basis	Inter aircraft communication	Surveillance	Surveillance	Surveillance & Flight Plan	Flight Plan
Purpose	Immediate infringement resolution	Alerting	Minimum Separation (vectoring)	Minimum Separation (route adherence)	Raise attention to future issues

Safety Nets – STCA – Conflict Detection

- STCA checks probability of 2 A/C being
 - Horizontally closer than e.g. 5 NM
 - Additionally: “Safe” geometry criteria in order to reduce nuisance alerts
 - “safe”: crossed + diverging + sufficient distance



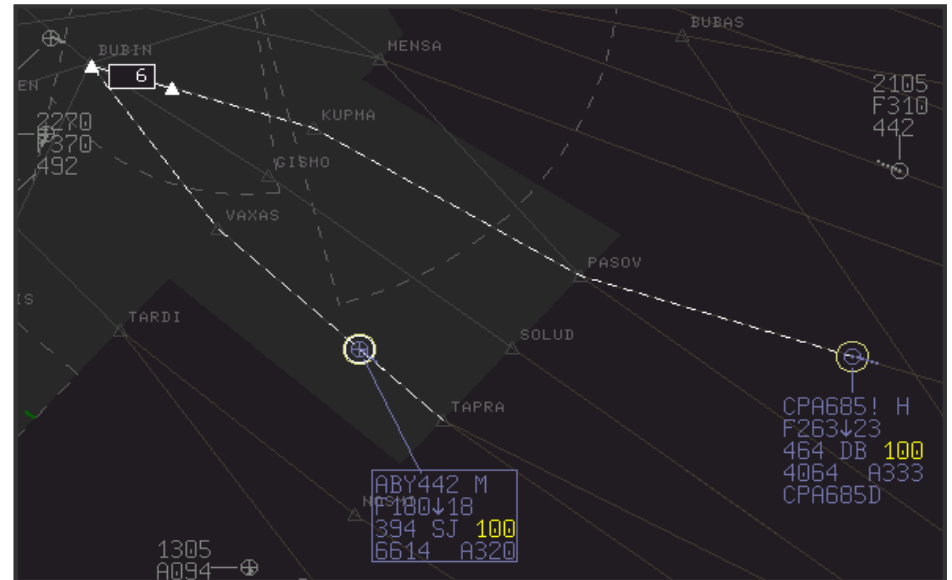
Safety Nets – STCA – Depiction

- The STCA is depicted in the Air Situation Picture (highlight)
- An audible alert is raised (manual suppression)
- The alert is listed in a window



Minimum Separation Tool

- The Minimum Separation Tool uses the flight routes, current position and ground speed of two tracks to calculate their closest point of proximity.
- Constantly updated based on surveillance and flight plan data



Surveillance Recording & Investigation



ATM trend: centralized operational recording concepts

Optimizeing OPEX for distributed systems

Central synchronized ATM data reconstruction

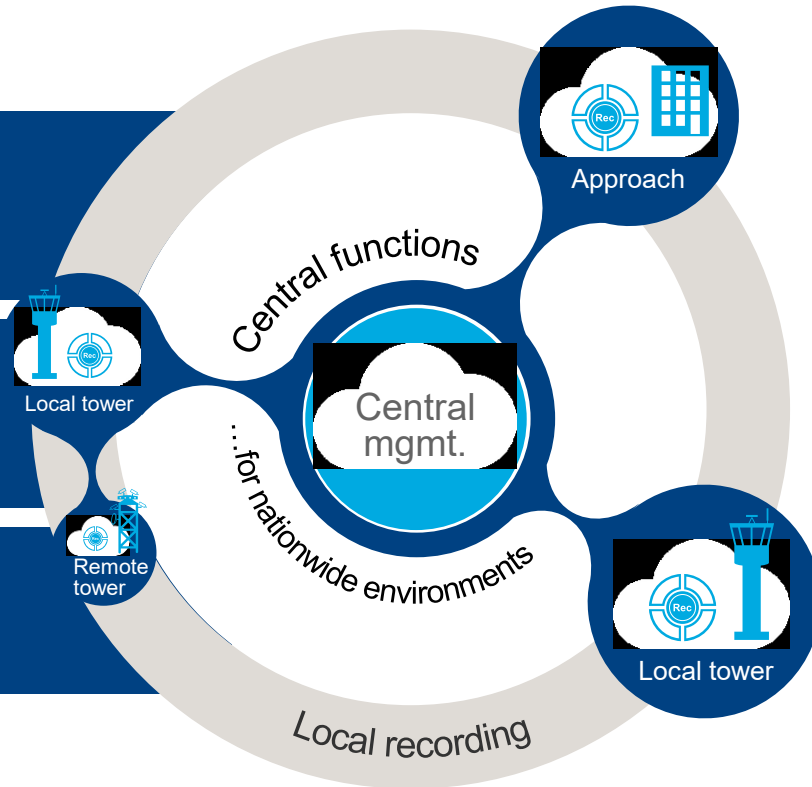
→ Complete survey of an incident on different sites

Central system supervision and health monitoring

→ Reduced downtimes on non 24/7 operated sites

Central configuration suite for remote parameterization

→ Common configuration from a central hub



Legal recording, replay and analysis of audio and surveillance data

R2D2-V2/RMD-V2

Recording & Replay of
Digital Data



Up to
300
Radar channels



Highlights

- Integrated FRQ product suite: R2D2 & DIVOS
- Compliant to the following standards
 - ICAO PANS-ATM (Doc 4444)
 - ICAO Annex 10, 11
 - EC No 1032/2006
 - EC No 29/2009
 - Eurocae ED-111
 - EUROCONTROL
Standard for RADAR Surveillance
(SUR.ET1.ST01.1000-STD-01-01)

User Benefits

- Legal Recording
- Incident analysis
 - Reconstruction of critical situations
 - Assessment of risks and decisions
 - Search and Rescue coordination
- System performance and tuning
 - Trajectory reconstruction
 - Sensor performance
 - Continuity and currency
- Training
 - Provide realistic training scenarios
 - Briefing and debriefing of training sessions

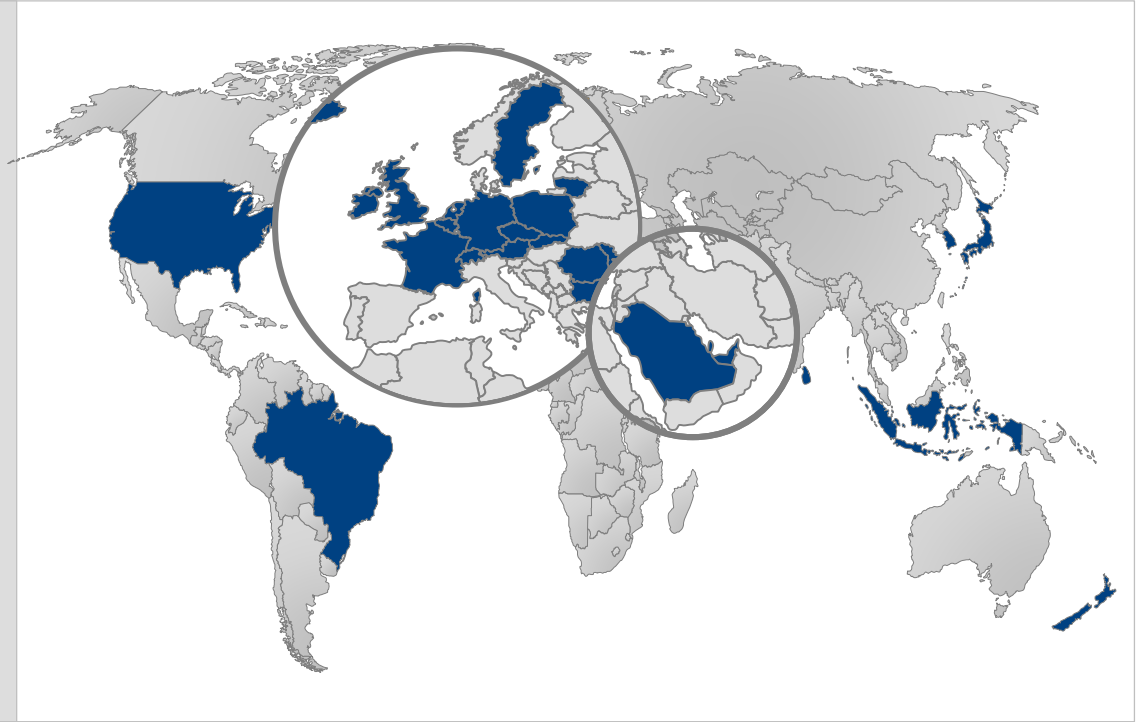
Recording & Replay – success stories

100 systems operational worldwide

2005

- Airport of Luxembourg, Luxembourg
- ANS (Air Navigation Services), Prague
- Armasuisse, Switzerland
- KVB (Cologne Public Transportation Service), Germany
- Luftwaffe (Air Force) ,Germany
- NATS, Great Britain
- RNLAf, The Netherlands
- Singapore , ST Electronics Singapore
- skyguide, Switzerland

2018



Surveillance Control & Monitoring



Control & Monitoring

Success stories

NATS UK Project: ERCAMS



Country-wide radar supervision infrastructure

- Configuration of CMS/XA system to **monitor 20 en-route radar stations**
- Control & Monitoring of close to **25.000 individual radar elements**
- One of the **most successful projects in NATS` history** saving millions of operating and maintenance costs

Luftwaffe Germany Project: ELISA



Country-wide control and monitoring system for military radar infrastructure at remote sites

- **Data exchange** over existing radar data network (MilRADNET)
- **All 18 radar sites** installed
- Ready for **unmanned operation**

Integrated control and monitoring system for control centres and remote sites

CMS/XA – Control & Monitoring

Dedicated to latest technology for data acquisition, processing and display

Uniform depiction of overall site conditions

User customisable rules for event processing

Versatile and flexible end-user tailoring to differing infrastructures

Observation of service level degree derivable from technical monitoring

- **Fully unified solution**
Supervision of a large number of remote sites simultaneously from one or several central locations
- **Utmost scalability**
From local, single-PC based equipment to a fully distributed, integrated control and monitoring system with multiple data acquisition sites and multiple control centres and sub-centres
- **Flexibility**
Modular design with high architectural flexibility enabling the system to accommodate any existing site and communication infrastructure
- **High reliability**
Redundancy concepts for all its components on hardware, software and networking level

25.000

individual radar elements monitored



FREQUENTIS

FOR A SAFER WORLD



Air Traffic Management



Defence



Maritime



Public Transport



Public Safety





FREQUENTIS COMSOFT

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Safety