ARTAS

Product & Services

The ARTAS (ATM SuRveillance Tracker and Server) system represents today one of the most advanced surveillance data processing systems in the world. More than 20 civil and military Air Traffic Service Providers use or plan to use ARTAS as a cornerstone of their national surveillance infrastructure.

Based on PSR, SSR, Mode S and ADS surveillance sources, ARTAS uses latest tracking technologies to deliver an outstanding level of accuracy and reliability in data output. ASTERIX is being used as universal exchange format for input and output, guaranteeing a straight-forward integration into existing ATC environments.

Based on its architecture ARTAS permits to separate the tracking functionality from the data server functionality, enabling powerful dedicated services, for each of the ATC/ATM users, including custo-mised services for TMA/Approach and En-Route users or any of the safety net and metering applica-tions.

ARTAS fulfils highest performance requirements, including service for a supervision area of up to 2048 x 2048 NMs. Up to 40 input sources of all the existing sensor types are supported by the system and at the output 4000 simultaneous system tracks can be maintained.

ARTAS is backed by a compre-hensive maintenance and support infrastructure, including an ARTAS User Group (AUG) and a well-defined set of product services for ARTAS turnkey installations.
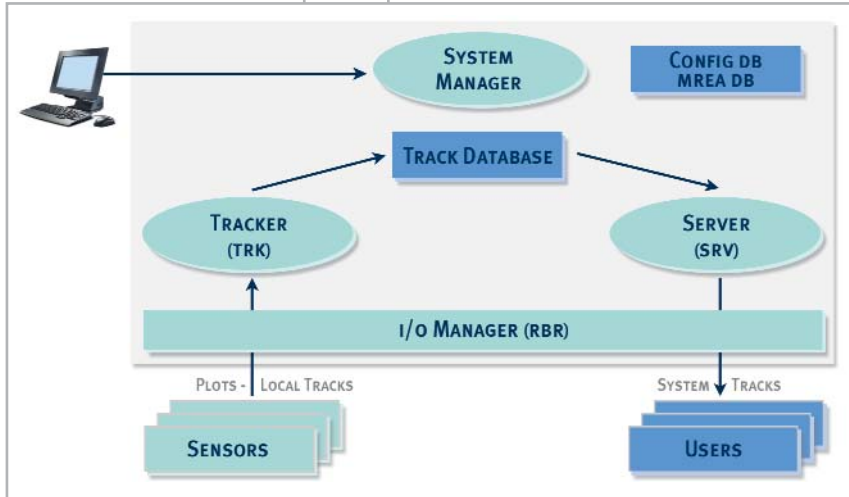
Highlights

- Powerful state-of-the art system tracker

- Supports PSR, SSR Mode S and ADS data sources

- ASTERIX as universal I/O format

- Highest Capacity and Performance Figures

- Available for Alpha/Tru64 and Intel/LINUX

- Comprehensive Support Infrastructure

- Turnkey ARTAS installations

- Total System Responsibility Service Contracts

Architecture

ARTAS follows a modular architecture with a clear functional decomposition of tasks. Sensor data arrives at the I/O manager, is decoded, pre-processed and forwarded sector-wise to the Tracker (TRK) component. Based on the input the

Tracker initiates, continues or terminates tracks using latest tracking technologies, including Joint Probabilistic Data Association (JPDA) and Interactive Multiple Modelling (IMM). The tracker updates a memory-resident track database and in parallel performs a Multi-Radar Environment Assessment (MREA), calculating, e.g., biases for each of the online sensors.

The Server (SRV) reads from the track database implementing for each of the users the specified service. Output is again via the I/O manager. A System Manager resides over the other components for initiation, monitoring and on-line control of the process. Initial configurations are loaded from a Configuration Database and the System Manager provides access to dynamically computed values (e.g. MREA output).

ARTAS Architecture


ARTAS Project Environment

ARTAS was developed as an industry project on behalf of EUROCONTROL, the European Organisation for Safety of Air Navigation. The ARTAS specification was defined in the 1990s and is based on a consolidated list of requirements, assessed and refined by tracker experts from the major European civil aviation authorities.

As part of its transition to operational service the system was validated in several extensive evaluation programmes by

EUROCONTROL and national administrations, taking into account a wide spectrum of application scenarios.

ARTAS is available as a product baseline for the platforms Alpha Tru64 and LINUX. For EUROCONTROL member states the application software is available on a cost-free basis. There exists a centralised support service, called CAMOS (Centralised ARTAS Maintenance and Operational Support), operated by EUROCONTROL together with their ARTAS industry partner COMSOFT.
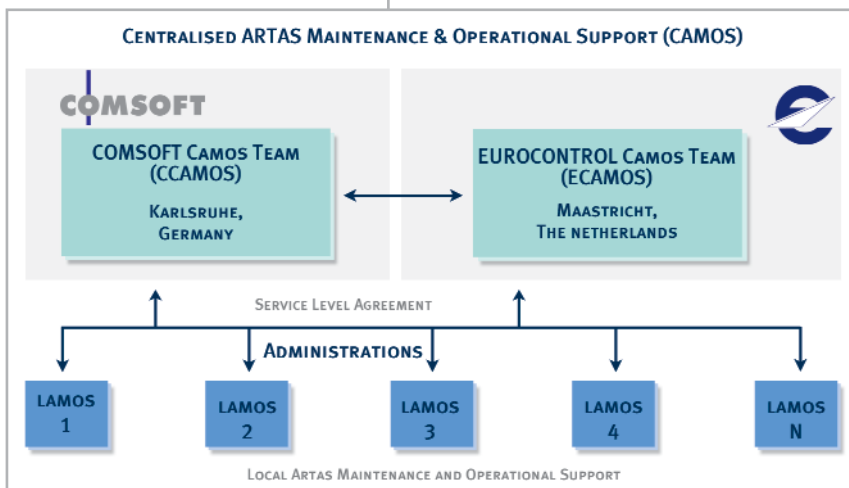
ARTAS is being continuously enhanced and extended with new features on application and system level. On recent contracts, COMSOFT extended ARTAS on behalf of EUROCONTROL to support Mode S Enhanced and ADS sensors, including the processing and forwarding of Downlink Aircraft Parameters (DAPs). On the system side, COMSOFT developed a LINUX version of ARTAS.

CAMOS Overview

ARTAS Services

ARTAS is a powerful and large system. This relates both to the number of system components that interact, much as to the number of COTS, OTS and application packages that have to be installed and properly tuned to make the system work. This requires the highest level of service quality.

TOTAL SYSTEM RESPONSIBILITY
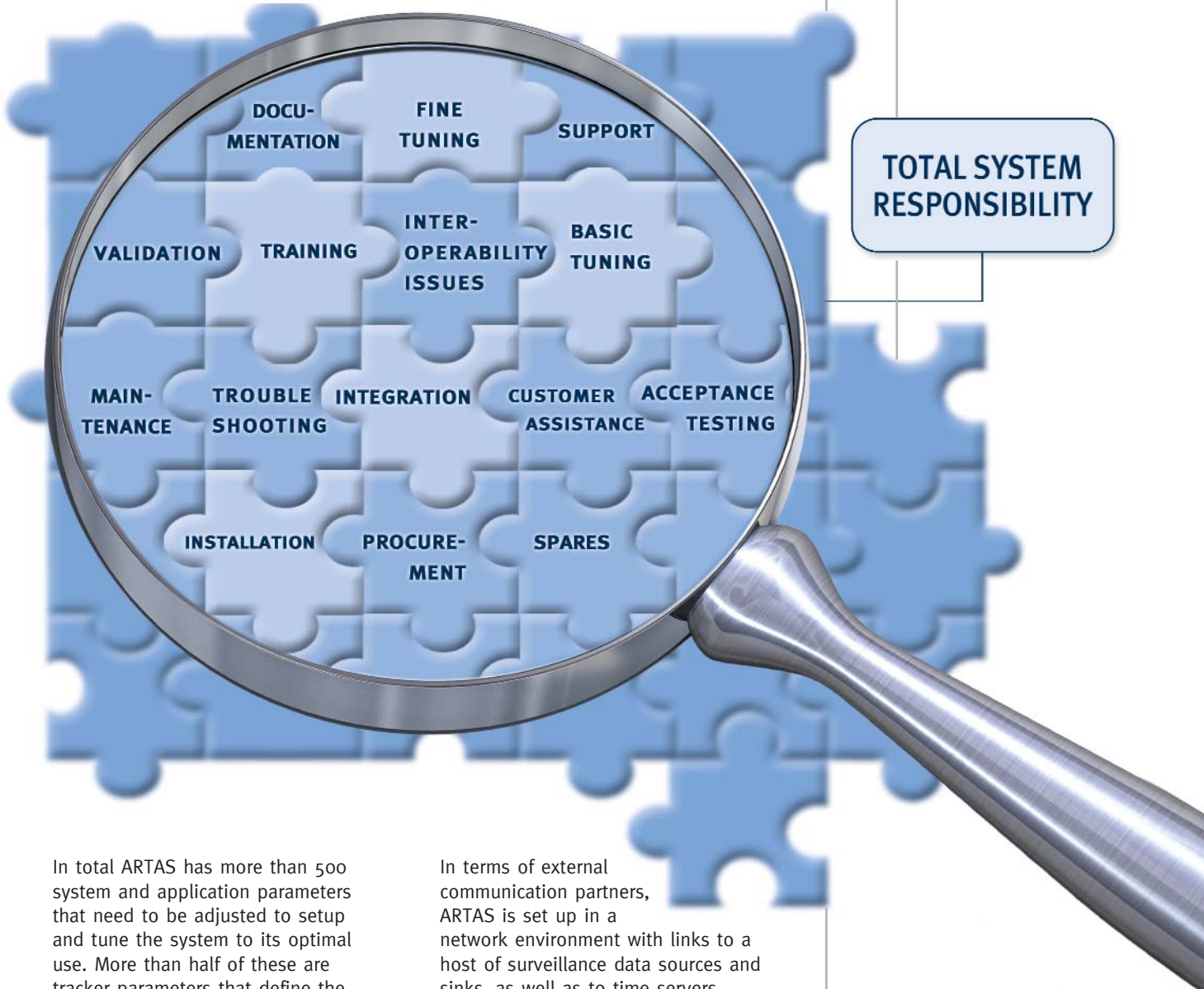
In total ARTAS has more than 500 system and application parameters that need to be adjusted to setup and tune the system to its optimal use. More than half of these are tracker parameters that define the application-level behaviour of the data processing. In addition, the ARTAS radar data base and the ARTAS geographical database host environmental data of the used surveillance sensors, AIS information and other contextual information needed for ARTAS operation.

In terms of external communication partners, ARTAS is set up in a network environment with links to a host of surveillance data sources and sinks, as well as to time servers, flight data processing systems and system management stations.

In order to assist the ARTAS user, COMSOFT offers turnkey installations of ARTAS. As part of this COMSOFT assumes a Total System Responsibility, ensuring the delivery of ARTAS installations that are in all aspects ready for operational use.

ARTAS Services Overview

Installation & Integration	- ARTAS, Hardware and COTS procurement, assembly and customisation - COTS adaptation and resolution of license key problems - Setup of ARTAS maintenance contracts with HW and COTS suppliers - Factory configuration of ARTAS system including setup of radar database, geographical database and service definitions - On-site installation and cabling - On-site communication setup and testing with external interface partners - Solving of interoperability issues - Acceptance testing for system and installation
Basic Tuning	- Surveillance data sampling using time-synchronised multi-source recording system - ASTERIX input checking and validation - Factory tuning with recorded live data - Customisation of ARTAS parameter files - On-site tuning with integrated live radar data sources - Performance Assessment
Fine Tuning	- Iterative process in cooperation with customer - Assessment of sensor input data(including SASS-C analysis) - Fine tuning of RBR, SRV and TRK CSCI parameters - Track quality analysis - Support of Customers in dedicated evaluation programs - Development of dedicated scenarios for special use cases - Participation of senior controller in tracker evaluation

References

In the past, COMSOFT has delivered ARTAS turnkey installations, ARTAS training, ARTAS integration and ARTAS fine tuning services to a large number of European administrations, both from the civil and military domain:

- ANS, Czech Republic
- ATSA, Bulgaria
- Austrocontrol, Austria
- Austrian Airforce, Austria
- CCL, Croatia
- German Air Force
- IANS, Luxembourg
- LFV, Sweden
- LVNL, Netherlands
- Maastricht UAC, EUROCONTROL
- NAV, Portugal
- NAVIAIR, Denmark
- Royal Netherlands Air Force
- Skyguide, Switzerland

In addition to this COMSOFT is rendering continuous site support services on behalf of EUROCONTROL as part of their CAMOS responsibility.

FAA, USA

PLANNED SITE
TEST SITE
OPERATIONAL SITE
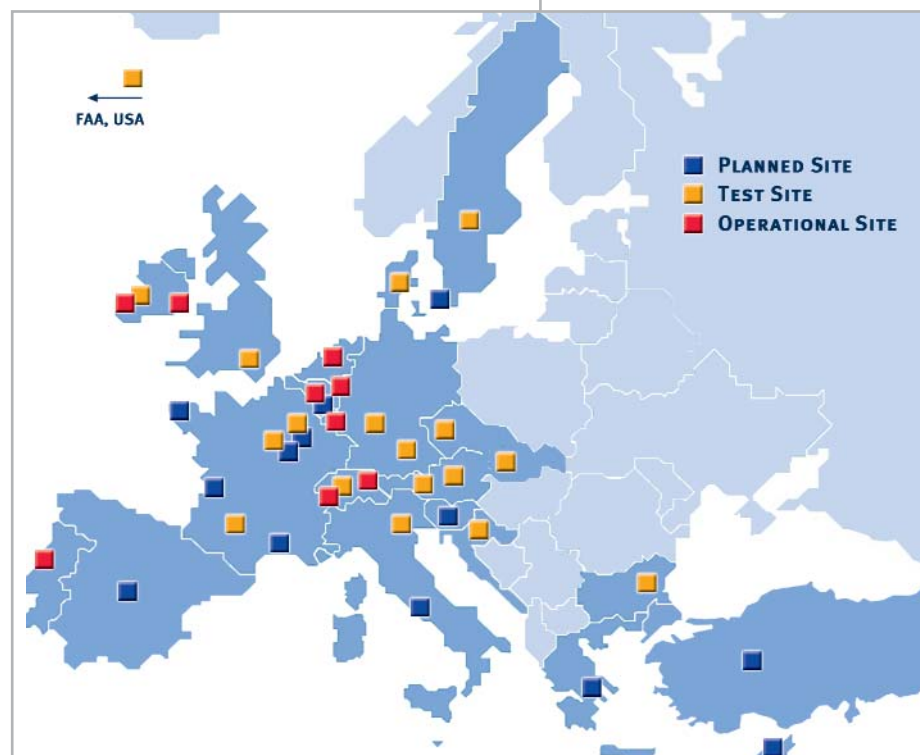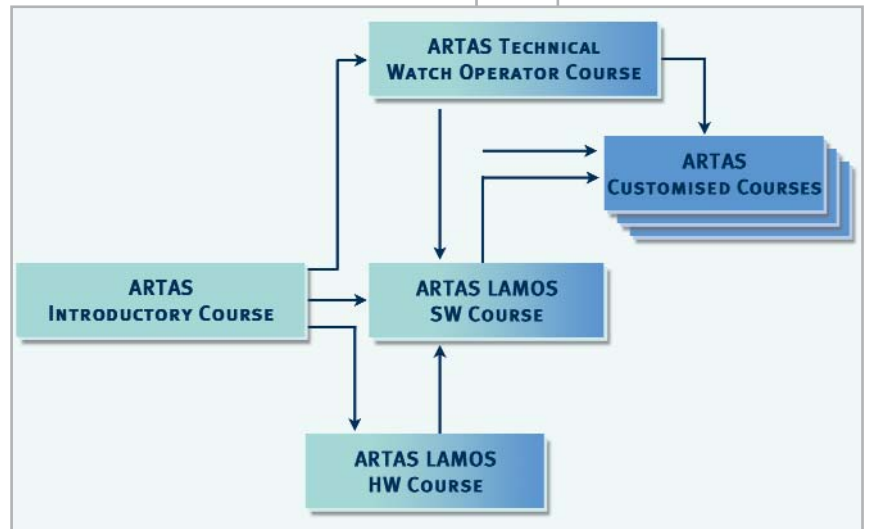
ARTAS Installations

Training

COMSOFT offers to administrations a standardised and field-proven ARTAS training suite. Training is carried out at the customer premises by a team of senior ARTAS specialists, all with several years of experience in ARTAS development and ARTAS maintenance.

Training addresses different types of customer staff and expert level, including management staff, Level A/B maintenance staff and LAMOS (Local ARTAS Maintenance and Operational Support) staff.

Training includes a mix of theoretical and practical course components and comprises presentation components, course handouts, exercises and optionally completion exams. At the end of the course each trainee will receive a Completion Certificate, identifying him as a trained ARTAS operator or maintenance personnel.

ARTAS Training Courses

Course	Intended Audience	Course Overview
Introductory Course	24x7 Technical Watch Operators Level A/B Maintenance Operational Engineering Support Management Staff Etc.	- Introduction into ARTAS architecture and functionality - ARTAS Project Background - Component-by-Component training for ARTAS Tracker, Server, Router Bridge, MMS and DAS
Watch Operator Course	24x7 Technical Watch Operators	- Introduction into ARTAS operation - First Level Trouble Shooting - Restoration of Service - Major monitoring and control commands
LAMOS Hardware Course	Level B Maintenance Operational Engineering Support LAMOS Team	- Introduction into Hardware and Operating System - Troubleshooting and fault recovery on operating system level
LAMOS Software Course	Level B Maintenance Operational Engineering Support LAMOS Team	- Introduction into System and Application Software - ARTAS Maintenance concepts - Troubleshooting on system and application level - ARTAS tool introduction - Introduction into Support infrastructure

ARTAS Technical Data

Performance Characteristics	- max. 2048 x 2048 NM supervision area - max. 40 surveillance data sources - max. 2000 plots/scan for each source - max. 4000 concurrent system tracks
Platform	- DEC Alpha DS 15 (TRU64) - INTEL (LINUX Red Hat ES 3) - Single or Dual (Hot Standby) Platforms
Communication Interfaces	- FDDI (SAS, DAS) - Ethernet (10BaseT, 100BaseT, Dual Switched LAN) - UDP/IP, TCP/IP, LLC1
ASTERIX Support	- Input: ASTERIX CAT 1, 2, 21, 23, 34, 48 - Output: ASTERIX CAT 30, 31, 32, 62, 63, 65, 252
Time Synchronisation	- NTP
Sensor Types	- Classical PSR, SSR, CMB - Mode S Elementary - Mode S Enhanced - 3D Radars - ADS (1090 ES, VDL Mode 4, UAT) - Multilateration (under evaluation)
Tracking Technology	- Multiple Radar Variable Update Tracker (MR-VU) - Extended Kalman Filtering (EKF) - Joint Probabilistic Data Association (JPDA) - Interactive Multiple Modelling (IMM) - Multiple Hypotheses Techniques (MHT) - Integrated Multi-Radar Environment Assessment (MREA) - Optional DAP (Downlink Aircraft Parameter) processing and forwarding
Service Types	- Periodical Service (Configurable Update Parameters) - Radar-Synchronised Service (Pseudo-Scan with Primary and Fallback Coupling) - Asynchronous Service (Flexible user-configurable update criteria)
Service Parameters	- Track selectors (geo filter, type filter, ..) - Item selectors (information depth) - Output of extended track state vector (incl. track accuracies, track ages, etc.) - Output in Stereographic Projection or WGS84
Supervision	- Sensor and Channel Supervision - Remote X-Terminal (LINUX PC) - SNMP (System and Application MIB) - HP OpenView based system management application (ESMS) - Radar Monitoring Display (RMD)
Recording	- User-configurable recording points - Input, output and internal state recording - Trace facilities

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