

# ASTERIX

## ALL-PURPOSE STRUCTURED EUROCONTROL SURVEILLANCE INFORMATION EXCHANGE

# COMSOFT

# PRODUCT INFORMATION

ASTERIX is the international standard for surveillance data. The format has proven to be an extremely powerful and flexible basis for a wide range of uses. Today a comprehensive set of COMSOFT ASTERIX systems and tools supports the market.

ASTERIX stands for All-purpose Structured Eurocontrol Surveillance Information Exchange. It was defined in the late eighties to overcome the deficiencies of the existing variety of national and vendor-specific formats and protocols.

Serving as an intermediate format, which can convey all the information present in any of the

existing surveillance data formats, ASTERIX contributes strongly to the standardization within the surveillance domain.

Based on a flexible structural base, ASTERIX is open to extensions resulting from developments in surveillance and surveillance data processing technology, as well as with respect to different applications using the format.

### HIGHLIGHTS

- Proven powerful and flexible surveillance data format
- Supports latest developments in communication technology
- Provides ideal support for migration from older formats
- Covers all surveillance sectors of ATC
- Chosen format for European Radar Data Networks (RADNETs)
- Comprehensive range of ASTERIX tools and systems available
- COMSOFT provides the world-wide only officially qualified ASTERIX Reference System and Test Tool



# WHAT IS ASTERIX?

The easy exchange of surveillance data within and between countries has always been a main objective of air traffic control. ASTERIX was devised to implement this. It represents an efficient and powerful surveillance data format into which all national and proprietary formats can be converted without loss of information.

## COMMUNICATION PERSPECTIVE

In ISO/OSI terminology, ASTERIX is an application and presentation layer standard (ISO Layers 6/7) and does not prescribe a specific link or transport protocol to support it. This has the invaluable advantage that ASTERIX can be used over a wide range of underlying transport links, including LAN and WAN protocols of the TCP/IP and ISO/OSI stacks (see figure).

## UAP

An ASTERIX User Application Profile (UAP) enables the customization to the number and type of data items used within a certain application, tailoring the exchange data format to a specific use, e.g. for a country-wide sub-network.

## TIMESTAMPING

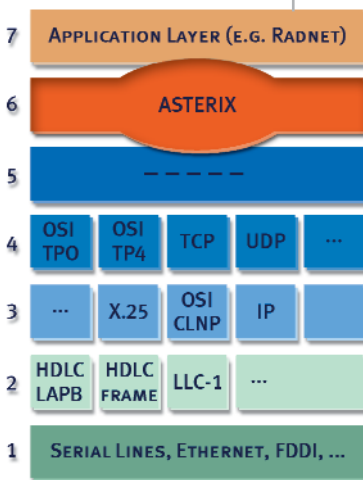
Another important feature of ASTERIX is the support of absolute (UTC) time-stamping at the surveillance data source, rendering ASTERIX especially suited for applications like multi-radar tracking relying on highly synchronized timing.

## CATEGORIES

One of ASTERIX' central concepts is that of data categories. The format defines up to 255 categories, each catering for the transfer of a specific kind of surveillance-related data. The most important are:

- 0 Time synchronization messages
- 1 Monoradar target reports
- 2 Monoradar service messages
- 3 Synthetic air situation picture (MADAP)
- 4 Safety nets alarms
- 8,9 Weather data
- 10,11 Ground surveillance data
- 17,18 Mode S radar data
- 21,23 ADS-B data
- 30,31, 32,252 Synthetic air situation data (ARTAS Data)
- 34,48 Target report and service messages
- 62,63 System track data and status messages
- 65 SDPS service status messages
- 150,151, 152 Exchange of flight data messages (ADMAR)
- 253 Remote station monitoring and control
- 190 Exchange of processed air situation (Mil.)
- 128,129 Military ASTERIX

A specific set of data items is provided for every category. These represent the smallest units of information and together form an ASTERIX record. The length of the messages is minimized by transmitting only those data items that contain significant information. A compact encoding of the information as well as avoiding redundancy as much as possible, aids in length reduction and improves efficiency.



ASTERIX Layers

# HISTORY OF ASTERIX

## A PART OF COMSOFT'S HISTORY

ASTERIX was originally specified in the late eighties within the context of the 4-State Integration Program between Belgium, Germany, Luxembourg and the Netherlands. Today it is a major cornerstone of the EATM (Programme for Performance Enhancement in European Air Traffic Management) a program which has the ultimate goal of establishing a homogeneous European ATC infrastructure.

In 1989 COMSOFT, German ATC systems provider, was awarded the contract for the world's first implementation of ASTERIX. This included the development of an RMCDE (Radar Message Conversion & Distribution Equipment), as well as the development and installation of the RADNET (Radar Data Distribution Network) based on RMCDEs. From the beginning the RMCDE was devised as a native ASTERIX engine. Over the years COMSOFT has built up a network of around thirty nodes, with ASTERIX as the unique internal format used.

Being the first company to implement ASTERIX, COMSOFT has with time gathered incomparable expertise in the practical use of the format. Up to now the company has implemented close to 30 conversions from and to other radar data formats. Today COMSOFT can offer a large spectrum of ASTERIX systems and tools, belonging to the most mature solutions on the market.

In 1998, COMSOFT's RAPS-II product underwent an EUROCONTROL qualification process to attest its eligibility as a universal ASTERIX Test Tool and Reference Product. In 2003 the qualification was renewed, now covering also all Mode S, ADS, Ground Surveillance and new ARTAS data categories. With the qualification of an ASTERIX tool, COMSOFT has again broken new ground in the surveillance sector, being the first company world-wide to demonstrate the required ASTERIX maturity level.

COMSOFT SYSTEM	RAPS	RMCDE	ADR	R2D2/RRR	RDD	RMD	RPX
ASTERIX FUNCTIONALITY							
COMMUNICATION	■	■	■				
CONVERSION	■	■	■				
RECORDING/REPLAY	■			■		■	
CERTIFICATION	■						
ANALYSIS	■					■	
DISPLAY					■	■	
TRACKING					■		■
SIMULATION	■						
EDITOR	■						
REPORT GENERATION	■						
QUALITY MONITORING	■	■			■	■	

COMSOFT Systems & their ASTERIX Functionality

## ASTERIX PRODUCTS & SOLUTIONS

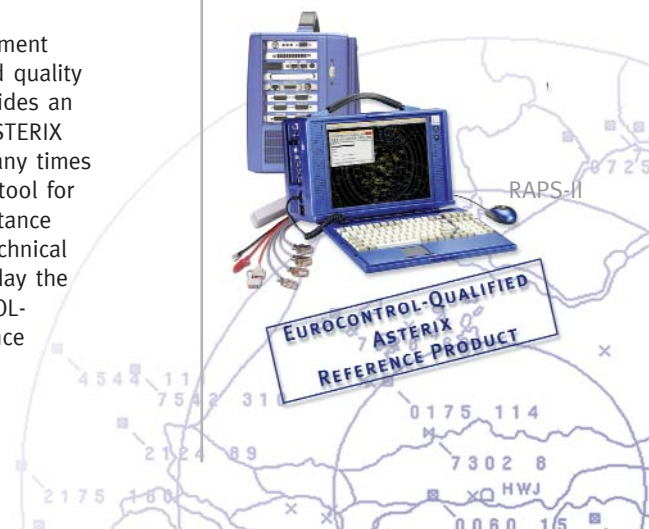
COMSOFT provides a large range of native ASTERIX-processing systems and tools for many domains of air traffic control.

All products are based on an open, modular architecture and incorporate today's forefront technology.

### RAPS-II

(Radar Analysis, Playback & Simulation System for Surveillance Data) is a powerful technical monitoring tool for ATC, supporting ASTERIX and many other surveillance data formats and protocols. The portable system allows simultaneous recording and replay of several live surveillance data streams and comprises a comprehensive set of features for ASTERIX analysis, user-defined filtering, processing, visualization and test data generation.

It also includes an assortment of ASTERIX validation and quality monitoring features, provides an ASTERIX editor and an ASTERIX simulator. RAPS-II has many times proven an indispensable tool for integration testing, acceptance testing and day-to-day technical monitoring. RAPS-II is today the world's first EUROCONTROL-qualified ASTERIX Reference Product and Test Tool.





RMCDE

## RMCDE & RADNET

The RMCDE (Radar Message Conversion & Distribution Equipment) is a powerful and highly versatile surveillance communication front end processor based on ASTERIX. It is capable of connecting on one side to almost all types of surveillance data sources and on the other side to all types of surveillance data processing equipment. A rich set of conversion functions, the support of all kinds of communication interfaces, as well as the networking and filtering capabilities of the RMCDE make it the optimal solution for a wide range of ATC environments. The system is the cornerstone of the European RADNET (Radar Data Distribution Network) and today represents a de facto standard for surveillance data exchange.



R2D2/RRR

## R2D2 & RRR

COMSOFT's solution for archiving, retrieval and replay of large amounts of surveillance and audio data. In addition to ASTERIX, a multitude of other radar data formats, like Eurocontrol, CD2 or RDIF are flexibly recorded and replayed via a wide range of protocols, e.g. X.25, HDLC LAP-B, HDLC Frame Level, LLC1, TP4 or UDP. In its synchronized version, the R2D2 system supports audio and digital interfaces like: ISDN E1/T1, Analogue and ISDN2. The system is highly scalable in terms of the number of recording/replay channels, operator working positions or storage volumes.



RDD/RMD

## RMD

(Radar Monitoring Display) is the real-time technical monitoring version of the RDD product family. Its field of application includes center-based or on-site surveillance and radar analysis, as well as system monitoring and supervision. It comprises low level analysis functions, a raw plot display, as well as logging and multi-channel correlation features for ASTERIX and further radar data formats. Like RDD it can be broadly customized with respect to supported data formats, system environment and user interface.

## ADR & RFC

ADR (All-Purpose Data Stream Replicator) and RFC (Radar Fallback Communication System) represent down-scaled versions of RMCDE in terms of functionality and redundancy. Both solutions provide outstanding conversion, distribution and filtering capabilities with commercial-off-the-shelf PC hardware. ADR and RFC follow the same open design architecture as RMCDE and find their application, among others, as radar communication front end processors for RDP fallback systems. Like RMCDE the systems are native ASTERIX engines, i.e. all internal processing is done in this format.

## RDD

(Radar Data Display) is COMSOFT's operational radar data display system, supporting ASTERIX and many other radar data formats. The system shows an outstanding flexibility, with respect to an easy technical integration into a large variety of existing environments, as well as with respect to the large number of supported application scenarios. Based on its broad scalability, ranging from PC-based stand-alone to networked solutions, RDD can be ideally configured for tower, approach and en-route centers.

## RPX

(Radar Data Processing Executive) is COMSOFT's POSIX-compliant software package for advanced mono- and multi- radar tracking of ASTERIX and other radar data formats. It combines modern tracking algorithms with state-of-the-art software technology. RPX was designed to be easily adaptable to a wide range of radar properties and parameter settings for operational use. This includes an easy and flexible on-site configuration facility. Besides its usage in dedicated RDP systems, the package is also available as part of COMSOFT's RDD, together establishing a radar data processing and display solution in a single-PC or a LAN configuration.

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