SURVEILLANCE DATA SERVICE, SUPPORT, TEST & EVALUATION SYSTEM

HIGHLIGHTS

- Versatile and flexible toolset for ATC environments and manufacturers
- EUROCONTROL qualified reference product for the ASTERIX standard
- Support of military ASTERIX defined by NATO
- User-definable or preset test and evaluation suites
- Online surveillance data real-time monitoring and analysis
- Experienced support team with wide service portfolio
The RAPS product is a powerful and versatile toolset for testing, analysis and validation, as well as generation of surveillance data. It is the world’s first officially qualified ASTERIX reference tool utilised around the globe. The system enables recording, replay and multichannel communication of a wide range of formats and protocols.

It provides highly sophisticated and flexible functions for filtering, format-sensitive evaluation, visualisation, transformation of data and the generation of test data. A fully graphical user interface facilitates its use.

The RAPS system offers multifaceted cases of application: it is commonly used by manufacturers as reference and test tool, by air navigation service providers in control centres or at radar sites for monitoring, troubleshooting or analysing any kind of surveillance information. RAPS has further become indispensable in critical situations such as integrating new systems into an existing environment or tracing and diagnosing problems occurring during acceptance tests.

Finally, RAPS is increasingly popular within the ATC community for error diagnostics on operationally running systems or test environments. With the addition of MILRAPS, in 2011, the field of application for this well-accepted analysis tool has even widened addressing our military customer’s needs. This unique derivate designed and developed for the requirements of the armed forces is available on two platforms – the Compact or the 3xD version with three unfolding LCD displays.

In order to cope with the increasing demands in the surveillance domain and to guarantee customer comfort and satisfaction, the implementation of new features and improvement of usability and performance of the application are among our highest priorities.

RAPS-3 in the standard configuration is used by many customers worldwide, however it can also be provided in a user-specific customised configuration.

Aside from delivering the tool, a highly experienced and motivated Surveillance Support Team is able to provide any kind of assistance in resolving on-site problems in the ATC environment, such as trouble shooting, acceptance and conformity testing. A large number of support services, training courses and customized workshops give the customer the opportunity to learn and benefit from Comsoft’s long experience in the ATC domain.

NEW FEATURES

- Latest EUROCONTROL ASTERIX Standard supported (www.eurocontrol.int/asterix) including Reserved Expansion Field Interpretation and Non-Standard Data Field Decoding
- Mode-S MB Data Decoding and Encoding
- Military RAPS version (MILRAPS) supporting NATO-defined ASTERIX (STANAG5535)
- Large number of new automated test and analysis suites
- Graphical Target Extractor
- Report Template Editor
- Weather Data Display
RECORDING & REPLAY & BRIDGE

- Independent simultaneous recording and synchronised replay of multiple data streams
- Rich set standard and non-standard protocols for serial lines and networks
- Online monitoring (display of protocol events, connection establishment, throughput, data integrity)
- Protocol-specific diagnostics functions and error history
- UTC precision time-stamping (DCF 77 or GPS)
- Online protocol and format conversion
- Online filtering, merging and splitting of multiple lines
- Remote control from independent systems in standard or user-defined sessions
- Surveillance data source detector
- User-defined scenario creation

DATA ANALYSIS

- Generation of reports based on user-defined templates
- Various Report types: Listings, Tabular, Summary, Enriched Reports, Graphics, Display Output
- Template editor for use-case specific tabular reports
- User-definable layouts for reports
- Reporting of encoding rule and format structure violations
- Warning for non-compliance to standard
- Surveillance data browser with search facilities
- Flexible export of surveillance data for further use with 3rd party tools such as SASS-C, MS Excel, Open Office Calc and external databases (MySQL, ORACLE)
- Complex one-click analysis suites

AUTOMATED SUITES

- ASTERIX Conformance Analysis and Data Repair
- Data Source Detection, Identification and Configuration
- Transmission Analysis (Delay, Line and Data Source Gaps, Errors)
- Radar Quality Analysis (PD-Pos, PD-Code, PD-CMB, North/Sector Evaluation)
- Statistics Calculation (Summary Calculations)
- Enrichments (Data Injection)
- SUT/REF Comparison for Radars, Sensors, SDPS, WGS84 Sources
- Conversion from/to and between ASTERIX
- Generic Applications (configurable by user)
- User Tools

FILTERING & DATA PROCESSING

- Offline and online mode
- Flexible user-defined rules for data filtering and transformation
- Simple and complex rules on logical format level
- Value-dependent filtering such as geographical characteristics, height or type
- Geographical Polygon filtering
- All non-ASTERIX formats can be translated into ASTERIX formats for further analysing with ASTERIX tools

DATA DISPLAY & PLOT SUPPORT

- Graphical visualisation of recorded or live surveillance data
- Support of Mode S, ADS-B and Multilateration data
- Zooming, centring, label adjustment
- Live analysis of input data
- Measuring of distances with cursor
- Extended trail history for selected targets
- Presentation of data on 2D and 3D grid
- Freely configurable parameters (zoom, translation, rotation)
- Enhancement of information by target labels providing full ASTERIX information
- High-performance, geospatial visualisation of Wide Area Surveillance Data for military data analysis.
- Selectable target display modes to adapt to operator experience and use-case
- Multiple display screens (3xD)
- Dynamically selectable symbol sets
- Display of a variety of map products overlaid by high-fidelity track symbols
- Standard applications for Surveillance Data Display are available or tailored configurations can be system-engineered for specific analysis applications on customer request.
- Military ASTERIX and non-ASTERIX support
**FUNCTIONAL PACKAGES**

**SURVEILLANCE DATA EDITOR**

**ASTERIX Format/Version Editor**
- Modification of ASTERIX category definitions and easy creation of new user-specific categories or versions (e.g. military or site-specific)
- Environment for generation and testing of complete new ASTERIX application sets

**ASTERIX Surveillance Data Editor**
- ASTERIX-sensitive data composition and display
- Manual generation of artificial surveillance data messages from ASTERIX Data field down to byte level
- Encoding of ASTERIX based on chosen ASTERIX Version
- Simultaneous presentation of the edited data
- Automatic repair of corrupted data files
- Editing of recorded, artificially created or imported surveillance data
- Efficient generation of test data suites for acceptance testing

**FLIGHT EXTRACTOR**
- Extraction of targets from graphical display
- Target selection by brush, fence, polygon or tracking rules
- Extracted data can be used for further analysis, real-time replay, simulation

**SIMULATOR**
- Artificial data streams based on user-defined input
- Generation of fixed target, monitoring messages, status etc.
- load profiles for system testing
- Systematically modified real data
- Erroneous messages and test sequences
- Generated ASTERIX Data can be converted into other formats

**DATA CONVERSION**
- Tailored for the use in test and pre-operational ATC environments
- Translation of different user-defined ASTERIX versions
- Quick conversion of ASTERIX data streams into legacy formats and vice versa

**FLIGHT PATH DATA GENERATOR**
- Data stream simulations of surveillance sensors and trackers
- Generation of target reports, plots and service messages for standard or user-defined (military) ASTERIX categories (e.g. radar, ADS-B, Mode S, MLAT)
- Conversion of generated data into non-ASTERIX formats
- Manual modification of generated data by using ASTERIX editor
- Simulation of error characteristics created by surveillance sensors (range bias, range gain, range accuracy, azimuth bias, azimuth accuracy)
- Definition of flights
- Graphical user-friendly HMI for generation of flights in predefined geographical areas
- Circular flight patterns
- Sequence of waypoints
- Flexible scenario generation in XML (flight generation rules)
- Target template editor

**SURVEILLANCE DATA REAL-TIME MONITORING & ANALYSIS**
- Real-time detection of target drops, jumping and false targets for Radar, ADS-B and MLAT
- User configurable alarm management with flexible event and threshold definition
- Visual and audio alarms
- Flexible notification mechanism
- Configurable target highlighting
- Black List generation based on data integrity, position accuracy and comparison with trusted data sources
- Monitoring of black listed aircrafts
- Comparison of ADS-B/MLAT reports with known references (e.g. radars)
- ADS-B verified by Radar
- Link to recorded raw data for further offline investigation
- ASTERIX and Non-ASTERIX format support
MILRAPS has been developed to explicitly cater for the needs and requirements of the armed forces. Just like the existing platforms, MILRAPS is a mobile analysis and test equipment but with a focus on supporting specific classified ASTERIX versions or the emerging military ASTERIX standard as defined by NATO.

A specific user-development environment allows for definition, implementation and testing of classified or user-specific ASTERIX categories. The specialised tool is available on two hardware platforms: the Compact or the ruggedized 3xD alternative.

MILRAPS operates as a universal converter between civil and military categories:
- Offline and real-time format translation from EUROCONTROL-defined ASTERIX Categories (1, 20, 21, 48, 62) into NATO Categories
- Conversion of military data into civil ASTERIX data to allow analysis of military targets with civil third party tools
- User-configurable Data Field Manipulation by injection and/or removing confidential information

**MILITARY ASTERIX DATA GENERATION**
- ASTERIX Editor for air surveillance and ground-based sensor data
- Target template-based generation of flights using NATO and classified categories

**MILITARY DATA DISPLAY – SPECIAL FEATURES**
- Multilevel, user-defined overlays and grids
- Customisable track/plot history
- 3D visualisation
- Multiple symbol sets (NTDS, MCE, MS-2525+subsets, MS-1477C, Icon-based, etc.)
- User-definable alerts
- Group selection support
- Configurable toolbars
- Numerous interactive queries and decision aids (bearing, position, distance, compass rose, etc.)
- Graphing and analysis utilities
- Extensive filtering capabilities
- WGS-84 Earth Model, various projections
- MAP Formats e.g. NITF, CIB, ADRG, CADRG, VPF, DAFIF, DTED
## TECHNICAL DATA

### Platform – Classic (portable PC)

- **Intel® Core™**
- Internal memory 16 GB
- 500 GB removable hard disk
- Up to 10 serial interfaces and 6 Gigabit LAN interface on-board
- 17” WUXGA display (1920x1200)
- 8.5 kg

### Platform – Compact X (ruggedised portable PC)

- Certified rugged body
- Resistant to dust, drop, vibration and demolition
- Salt fog compliance (optional)
- Certified to UL1604 Class 1, Division 2, Group A/B/C/D (optional)
- MIL-STD810G certified
- MIL-STD461F ready
- IP65 compliant
- **Intel® Core™ i7** 3.33 GHz
- Internal memory 8 GB
- 500 GB SSD
- Up to 32 serial interfaces (external) and 2 Gigabit LAN interfaces (on-board)
- 16” Full HD display
- 5.2 kg

### Platform – 3xD (ruggedised portable COTS solution)

- **Intel® Core™j7** (high performance graphic platform)
- Up to 3TB removable storage capacity with on-board RAID
- Up to 10 serial interfaces and 4 Gigabit LAN interfaces
- Triple 17” SXGA LCD display (3840*1024 resolution)
- 29.5 kg

### Operating System

- Red Hat Enterprise based Linux (CentOS 6.4)

### HMI

- Fully graphical, user-configurable, plug-in feature for 3rd party products

### ASTERIX

- Supported categories: EUROCONTROL Standard, NATO STANAG5535
- Multi-version support
- Current & previous versions, dialects and customised
- User-defined versions

### Other Data Formats

- AIRCAT, Alenia, CAA, CD2 (all major dialects including CD-1, CD2, CD-2, ARSR-3, ARSR-4, ASR-9, FPS-117, STARS, SCIP), NAVAIR, EURO, F200, FPL, GAF, HADR, RRP, LR, MADREC, MSSR, NAV1, NMEA-GPS, RDE, RDIF, RLD, SVE, SR, Transparent, U2J

### Protocols

- HDLC LAP-B, HDLC Frame Level, Async, AIRCAT, CD2, LLC1, TCP/IP, UDP/IP, IPv6, further protocols and formats on request

### Time Synchronisation

- GPS, DCF-77, NTP
Comsoft, now Comsoft Solutions, has continuously refined and upgraded the RAPS technology since the first implementation of ASTERIX in 1989. Since then RAPS benefits from our long-time and ever increasing expertise in the field of surveillance data testing and helps civil and military aviation authorities as well as manufacturers to align and test their ASTERIX implementations.

Qualification certificates issued by various organisations endorse the trustworthiness of the product. EUROCONTROL and a recognised German research organisation evaluated the product and certified RAPS as recommended ASTERIX test tool and reference product.

RAPS supports all currently existing standardised ASTERIX categories and also allows the operator to choose among different ASTERIX versions. Moreover, its progressive processor is capable of converting all earlier versions backwards. Comsoft Solutions is closely monitoring the standardisation process and provides upgrades to forthcoming versions of the ASTERIX standard as soon as they are available.

Additionally, the user can define new, work-case dependent ASTERIX categories as well as user application profiles (UAP) according to the specific requirements of an application. Surveillance data - recorded, artificial or imported - can be edited on byte level or on ASTERIX item level.
RAPS has been sold to numerous customers around the globe with diverse fields of application. ATC centres generally use RAPS as a measurement and analysis system, while manufacturers appreciate the system as an independent reference system for acceptance testing of various systems and applications. Military customers on the other hand prefer generating and analysing data. More than 100 systems are currently in operational use in various test and evaluation scenarios supporting each individual user at mastering his own challenge.
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### Operational Assistance

On site assistance from support engineer with fully equipped RAPS-3 tool for any scenario.

- Troubleshooting
- Simulations
- Configurations
- Generation of templates, filters, categories
- Any surveillance data processing

### Application

Various services related to the operation of a RAPS-3 system in any given application context.

- Analysis/processing of surveillance data
- Conformity testing of ASTERIX implementations
- Search and handle surveillance data distribution and processing problems
- Surveillance data quality analysis - generation of test environments, automated test scenarios and data samples
- Generation of evaluation reports with recommendations for problem solutions

### Additional Information

#### Scenarios may be:
- Troubleshooting
- Simulations
- Configurations
- Generation of templates, filters, categories

#### Application may be:
- Analysis/processing of surveillance data
- Conformity testing of ASTERIX implementations
- Search and handle surveillance data distribution and processing problems
- Surveillance data quality analysis - generation of test environments, automated test scenarios and data samples
- Generation of evaluation reports with recommendations for problem solutions

#### Also refer to Engineering Support

- RAPS customer

### Pre Sales Support

- Assistance for future RAPS customers in selecting the proper hardware and software modules for their particular environment or field of application
- Assistance during the implementation of new use-cases
- Product or feature presentations can be arranged at Comsoft Solutions or at customer’s site

### After Sales Support

- On demand support for troubleshooting, system handling procedures and application context
- Extended service hotline & express e-mail support
- Software upgrades

### General RAPS Services

#### Documentation

Documentation tailored to the individual range of deliverables:

- Hardware platform (Classic/Compact), components (physical interfaces)
- Accessories (cabling adapters)
- Software packages/features
- Formats
- Protocols

Documentation consists of:

- Quick-Start Guide
- Operator’s Manual
- Administrator’s Manual
- Trainings Documentation
- Product Presentation
- Product Catalog
- Product Flyer

- Warranty extendable by support contract

#### Training

- Beginner training for new customers
- Refresh training for RAPS user
- Workshops for experienced power user

#### Equipment Rental

RAPS-3 hardware and components can be rented. In case of a resulting purchase of the equipment a discount the rental fee will be subtracted from order amount

#### Service Database

Comfortable online access to considerable support and service database containing and administrating user questions, trouble reports and corresponding solutions and improvement proposals

Confidential content management

- Notification option for changes and considerable trouble reports

Future implementation

- RAPS customer

- Non-RAPS customer