

# RMCDE

## RADAR MESSAGE CONVERSION & DISTRIBUTION EQUIPMENT

# COMSOFT

# PRODUCT INFORMATION

The RMCDE is a highly versatile and technologically superior system for radar data exchange. Unique world-wide in its kind it today represents a de facto standard for radar data communication. The system is cornerstone of the European RADNET (Radar Data Network) and key to its success.

The RMCDE is a flexible radar communication front end processor, capable of connecting on one side to almost all types of radars and on the other side to a variety of different radar processing equipment.

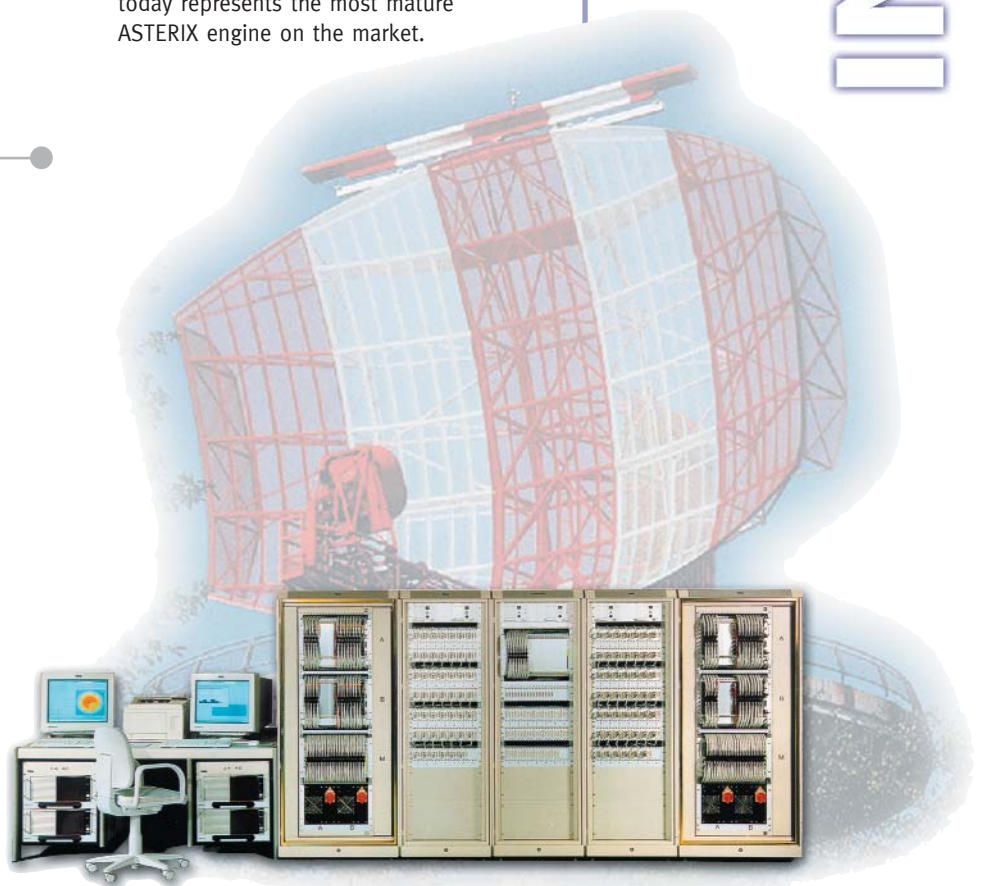
A rich set of conversion functions, the support of all kinds of communication interfaces, as well as the networking and filter capabilities of the RMCDE make it a supreme solution for a wide range of ATC environments.

The open and modular architecture of the RMCDE hardware and software, as well as its broad conformity to international standards guarantee utmost scalability and adaptability.

Today more than 70 installations of the RMCDE in over 45 air traffic control centers are operational. The equipment was the first world-wide to implement the ASTERIX (All-purpose Structured Eurocontrol Radar Information Exchange) standard and today represents the most mature ASTERIX engine on the market.

### HIGHLIGHTS

- Highly adaptable and expandable radar data communication processor
- Wide range of supported formats and protocols
- Fault-tolerant hardware and software architecture
- Outstanding reliability and availability properties
- Powerful set of radar data conversion, distribution and filtering features
- Native ASTERIX engine



# FUNCTIONAL FEATURES

## DISTRIBUTION

- 1: N distribution of plot and track data from arbitrary source to any number of sinks regardless of location
- Real-time transport with minimum end-to-end delays ( $< 50$  msec)
- Enhanced reliability on various architectural levels
- Wide range of supported LAN/WAN interface types and protocols
- Flow control on application level with priority-based load reduction
- Network functionality including intelligent routing and WAN multicast techniques
- Automatic adaptation to failures of network nodes and links

## CONVERSION

- Sensor and track data conversion between any of a large number of civil and military formats
- Speed conversion and adaptation of line characteristics (V.11/V.24, LAN/WAN, etc.)
- Support of all standardized ASTERIX categories and User Application Profiles (UAP)
- Country-specific ASTERIX application support
- Open architecture for future extensions of the ASTERIX standard
- Conformance to latest international standards

## TIME SYNCHRONIZATION

- Precise time stamping based on UTC (GPS, DCF 77, internal clock/crystal backup)
- Time conversion between relative (TIS) and absolute time

## SYSTEM & NETWORK MANAGEMENT

- Fine-grained diagnostics on interface, protocol and application level
- Accurate online delay time measurements
- Graphical status visualization
- Definition of nodes, network topology and connections
- SNMP interface
- Interface to COMSOFT's CRMCS (COMSOFT Radar Network Monitoring and Control System)

## FILTERING

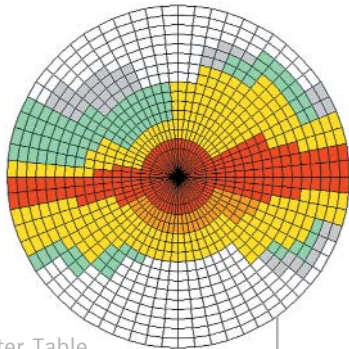
- Manual and automatic input of user-defined filtertables for plots and tracks
- Height band filtering
- Geographical filtering
- Message type filtering
- Weather Filtering
- Intelligent filter evaluation and optimization strategies

## FLANKING FUNCTIONS

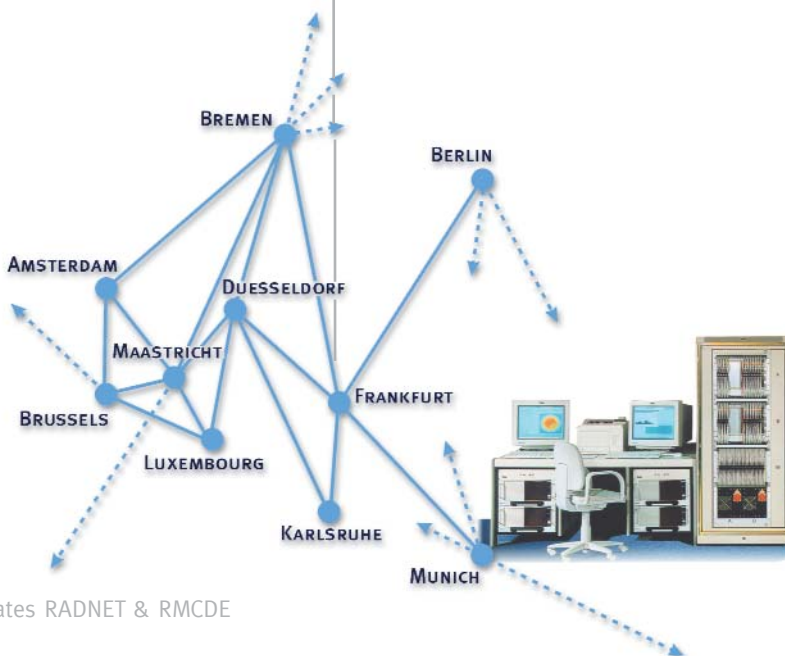
- Flexible user configuration management
- Software update support
- Access control
- File transfer, printing, internal mail function

## ARCHITECTURE

- Redundant hardware units (operational and hot standby)
- Manual and automatic switching modes
- Board system with scaleable hardware architecture in terms of board type and number
- Operator Subsystem for configuration and system monitoring
- LINUX-based working position with fully graphical
- HMI with OSF/Motif User Interface
- Native ASTERIX engine (all internal processing based on ASTERIX)



Filter Table



4-States RADNET & RMCDE

# RMCDE USAGE

The RMCDE is a versatile equipment that can be scaled and configured in a large number of ways. As a result, the number of scenarios, for which it can be employed is extensive. Often an evolutionary use can be observed: The RMCDE is first applied to support national modernization programs, later the equipment helps the country to connect to neighboring states for radar data exchange, and finally the same physical equipment is integrated into a wide-spanning, flexible radar data network.

## RADAR DATA EXCHANGE

The RMCDE enables radar data exchange within and between countries. By means of its powerful set of conversion functions it permits any kind of radar data to be used by any kind of user at any location. This is why many countries have in the past, chosen the RMCDE as the base element of their national radar communication infrastructure.

## NETWORK SOLUTIONS

As successfully demonstrated by the European RADNETs, the RMCDE enables the build-up of powerful national or multi-national radar

communication networks. Centers no longer have to connect separately to all sensors but immediately obtain total radar coverage, regardless of their geographical location or the location of the radar stations.

## MIGRATION SUPPORT

The RMCDE allows the use of old sensors with new radar processing equipment and vice versa. This establishes investment security and helps a country or a center to decouple the modernization of radar stations from the modernization of RDP, allowing a smooth and step by step transition to new technology.

# SUMMARY OF BENEFITS

## SUPERIOR TECHNOLOGY

The RMCDE is based on the latest international standards and uses forefront hardware and software technology. It represents a solid base and a strategic element of a country's future in ATC.

## COST SAVINGS

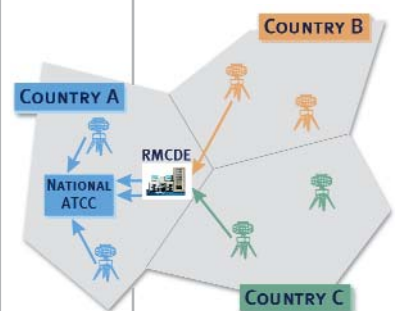
The sharing of radar data via the RMCDE has proven a decisive cost saving factor, avoiding investments in new sensors, as well as helping to significantly reduce PTT line costs by using a radar data network.

## SAFETY

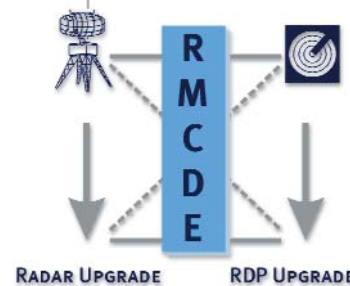
The sharing of radar data increases coverage and adds to accuracy and reliability of surveillance. In addition, an RMCDE networked solution provides contingency options enabling the mutual backup of whole centers.

## INVESTMENT SECURITY

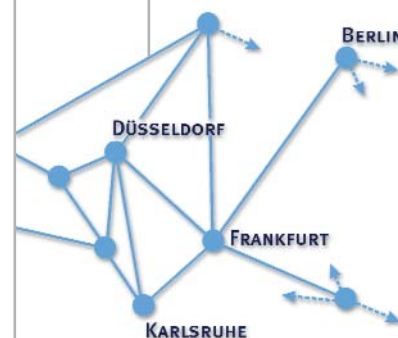
The easy extensibility of the RMCDE with respect to new protocols and formats, as well as its flexible use within a wide range of application scenarios guarantee a maximum cost-effectiveness of the equipment for a long period of time.



Radar Data Exchange



Migration Support



Network Solutions

## TECHNICAL DATA

Interfaces	Up to 104 serial interfaces (V.24 or V.11) 10/100 Mbit/s Ethernet, FDDI (DAS)
Formats	ASTERIX, RDIF, EUROCONTROL, CD2, CAA, Aircat, RDE, RLD, RRP, RDE, NAV 1, various military formats (further formats in preparation)
Protocols	HDLC LAP-B, HDLC Frame Level, X 25, OSI/TP4, TPD, CLNP, LLC1, ES-IS, UDP/IP, TCP/IP, SNMP V.1, various proprietary protocols
Time Services	DCF 77, GPS, crystal backup
Availability	Computed Availability: 99,999986%
Maintainability	MTTR (Mean Time To Repair): 15 min
Delay (internal)	< 50 msec per plot at high data load
Throughput	> 10.000 plots/sec
Hardware	Rack-mounted multiprocessor board system Server-based operator subsystem
Software	Realtime operating system for core communication units HMI based on LINUX and OSF/Motif

## RELATED PRODUCTS

RDD (RADAR DATA DISPLAY) & RMD (RADAR MONITORING DISPLAY) are Intel-server-based and broadly scaleable COMSOFT display solutions. RDD is an operational display, especially suited to medium-sized ATC centers and tower applications. RMD provides special features for technical monitoring. Both systems are available separately or integrated into the RMCDE environment.

RPX (RADAR DATA PROCESSING EXECUTIVE) is COMSOFT's real-time software package for high precision mono- and multi-radar tracking. The package is available as an integral part of the RDD or as a stand-alone solution for a COTS PC or a workstation under a UNIX platform. RPX has an optimized interface to RDD.

RRR (RADAR RECORDING & REPLAY SYSTEM) is a forefront recording and replay system, compliant with ICAO and EUROCONTROL specifications. In conjunction with the RMCDE a synchronized recording "out of the wall" of all critical ATC data is possible.

CRMCS (COMSOFT RADAR NETWORK MONITORING & CONTROL SYSTEM) is a comprehensive and user-friendly network management system for RMCDE-based radar networks.

ADR (ALL-PURPOSE DATA STREAM REPLICATOR) & RFC (RADAR FALLBACK COMPLEX) are down-scaled versions of the RMCDE acting as flexible radar communication fallback systems. Both are available on COTS PCs.

RAPS - II (RECORDING, ANALYSIS, PLAYBACK & SIMULATION SYSTEM FOR SURVEILLANCE DATA) from COMSOFT is a portable PC solution with a wide range of powerful functions for technical monitoring and integration testing. RAPS-II is the only EUROCONTROL qualified ASTERIX Test and Reference Tool. It serves for conformance testing of the latest ASTERIX standards including Mode-S and ADS-B.

# COMSOFT

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