

# R2D2®

## RECORDING & REPLAY OF DIGITAL DATA

# COMSOFT

# PRODUCT INFORMATION

In response to the increasing demand of ATM environments for integrated high-performance recording and replay systems, COMSOFT presents the R2D2® high-end solution. The modular architecture, high scalability and outstanding reliability make the R2D2® suitable for ATC facilities of all types and sizes.

R2D2® is COMSOFT's answer to the need for recording and replay of any data, particularly surveillance and audio data.

R2D2® is an innovative solution, based on commercial off-the-shelf components and the latest software developments. R2D2® features a modular and open architecture and thus allows easy integration and scalability.

Well-proven technologies paired with the ATC-specific expertise of a

supplier active in this field for many years, make the R2D2® solution the best choice to guarantee utmost reliability, investment security and value for money.

Whether in the form of compact tower systems or large-scale centre installations, R2D2® provides the ideal solution, tailored to the customer's requirements. The extremely high flexibility in the system design allows easy adaptation to individual needs in terms of storage capacity, number of channels or workstations.

### HIGHLIGHTS

- Digital recording of data and audio
- Wide range of surveillance protocols, data formats and telecommunication interfaces
- Long-term storage with optional RAID system combined with archiving to DVD, USB, mounted disk for offline archive
- Fast online and random access to recorded data
- Concurrent usage on multiple client workstations via common browser interface
- Fully synchronized of data and audio streams
- Customisable alarm management including SNMP support and alarm & control panel
- Open modular and scalable system concept based on COTS hardware and standard software



## SECURE RECORDING & COMMUNICATION

The R2D2<sup>®</sup> servers provide interfaces to analogue and digital data sources (audio, radar and video). All information received at the input interfaces are precisely time stamped and recorded by the servers.

In air traffic control it is absolutely required that your data is continuously recorded. To guarantee uninterrupted recording R2D2<sup>®</sup>'s recording function works independently from other system functions. Once data is stored in the local archive further processing can be initiated without jeopardizing the recording.

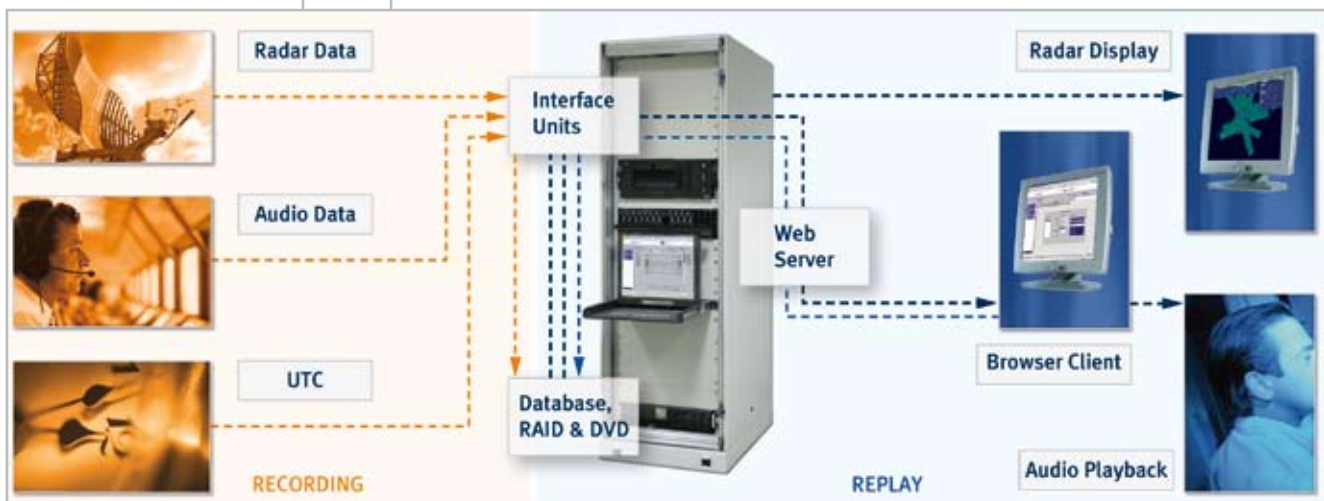
User access to the recorded data is only provided via Web Services without direct data access, which

makes manipulation of data practically impossible.

Since the information is stored in digital data format instant access to any part of the recording is possible.

Supported radar data formats:  
ASTERIX, AIRCAT, CAA,  
EUROCONTROL, F200, LR, NAV1,  
RDE, RDIF, RLD, SVE, RRP, SR  
Protocols: CD-1, CD-2, X.25, HDLC  
LAPB, HDLC Frame Level, LLC1, TP4,  
TCP/IP, UDP/IP, UDP Multicast

### System Architecture



## DATA STORAGE & ARCHIVING

All information is stored in digital format providing long-term storage for years without compromising data quality. The centralized data storage uses latest RAID technology up to level 5. It guarantees data safety and integrity for decades. RAID technology, compared to single hard drives, provides:

- Increased, integrated capacity for high volumes of contiguous disk space
- Higher data security through redundancy
- Improved performance
- Improved availability
- Increased fault tolerance
- Best ratio of data security versus cost

All system configuration parameters are stored using a regular SQL database (e.g. MySQL, Oracle, etc.) on the server. Depending on authorisation settings the configuration data is accessible by all clients at any time and is backed up periodically.

Data archiving (manual and automated), retrieval and duplication is extremely comfortable. DVD RAM disks, USB devices or mounted disk volumes are used for the purpose of long-term archiving.

## STATE OF THE ART USER ACCESS VIA WEB INTERFACE

R2D2<sup>®</sup> provides an easy-to-use browser based user interface that allows access to the server via LAN from any registered PC or workstation anywhere in the network. The Web Server implements all necessary services for both System Management and Audio-Monitoring/-Replay using the browser's standard multimedia features. This allows distributed processing of audio data without additional speaker cabling between server and client units.

From any workstation you can access R2D2<sup>®</sup>'s functions including:

- System administration and configuration
- System overview, system and recording statistics
- Alarm management and alarm history, incident and system message overview
- Recording status and monitoring
- Replay control and audio replay
- Archiving and retrieval

R2D2<sup>®</sup> was tested on all popular browser implementations (Firefox, InternetExplorer). The client workstations only need a common sound card and loudspeakers together with

the free Java runtime version. No additional installation is required.

Customer Values:

- Substantial reduction of client installation and operating expenses
- High user acceptance
- Minimal user training

R2D2<sup>®</sup>'s Web-Interface was designed for efficiency:

- Fully synchronized replay of data streams of different types and sources
- Simultaneous access from multiple LAN-workstations
- Alternatively secure access to audio and surveillance data by WAN (adequate bandwidth presumed)
- Configuration of system alarms (alarm box, relay, SNMP, mail, ...) and incident overview
- Replay of archived data streams on reproducer workstation off-site

The browser based interface offers fastest possible access to mission critical data from anywhere at any time!



Channel Statistics Overview



Scenario Replay

## SCALABILITY & COST OF OWNERSHIP

R2D2<sup>®</sup> features a distributed architecture consisting of central server units and client applications running on a local network. Multiple clients on common multi-media capable PCs that are connected to the R2D2<sup>®</sup> server through a LAN infrastructure can access and manage the recorded information using Web Services. Therefore no investment is necessary for new client machines.

Its modular and scalable architecture enables R2D2<sup>®</sup> to integrate perfectly into any environment and thus provides the necessary growth potential for future extensions and challenges.

Enhancements with e.g. COMSOFT RMD (Radar Monitoring Display) are extremely easy. RMD connects to R2D2<sup>®</sup> via LAN and allows for direct data monitoring as well as for dedicated audio and data playback. Export and import features enable offline analysis.





R2D2<sup>®</sup>'s hardware is based on commercial of the shelf components. This offers a variety of benefits:

1. The initial investment costs are low.
2. Long-term availability is guaranteed and
3. support and maintenance costs are minor.

R2D2<sup>®</sup> is a secure long-term investment for air traffic service providers worldwide.



## TECHNICAL DATA

	Platform	Intel server-based off-the-shelf technology Storage: RAID, DVD RAM
	System Software	Operating System: Linux Database: MySQL or Oracle
	Time Synchronisation	GPS, DCF77, NTP
	Surveillance Data	Communication Interfaces: V.24/RS232, V.11/RS422, FSK, Ethernet, FDDI All combinations of different interface types can be supported in one single server. Protocols: X.25, HDLC LAPB, HDLC Frame Level, CD1, CD2, AIRCAT, EUROCONTROL, LLC1, UDP/IP, DP/Multicast, UDP Broadcast, TCP/IP; others on request Recording is performed in a fully transparent and format-independent manner.
	Audio Data	Communication Interfaces: Analogue radio/telephone inputs (4/2 wire) ISDN, E1 Digital G.703, T1 Digital. Different types of input interfaces can be combined in one single server. Voice Processing: ITU-T G.711 & G.712 PCM, G.726 32/16 ADPCM, GSM 6.0
	Client Platform	Common PCs with browser (Internet Explorer, Firefox) and multimedia extension.

## ON THE SIDE ...

### APPLICATIONS

R2D2<sup>®</sup> has all properties needed for legal recording in ATC environments. It is also ideally suited for online and offline technical analysis, for incident investigation, for search and rescue, as well as for training and simulation.

### REPLAY ENVIRONMENT

R2D2<sup>®</sup> is configurable for playback into the original environment or works as a stand-alone analysis solution. Ideally it is combined with the various COMSOFT analysis tools. In the form of a reproducer working station it is possible to use data that was archived to external media for replay with full (time) information.

### CONFORMITY

R2D2<sup>®</sup> has been developed under full consideration of the recommendations given by the relevant documentation NATS CAP 670, ICAO Regulation s Annex 10, Volume 2, Paragraph 3.5 and EUROCAE ED-111.

### ADDITIONAL TOOLS

R2D2<sup>®</sup> provides extensive import and export features. Recorded data can be exported to external media for offline backup. Or it can be transferred to radar quality assessment tools, such as the SASS-C or RMD, for further detailed analysis. COMSOFT's Radar Monitoring Display (RMD) can connect directly to R2D2<sup>®</sup> for monitoring purposes as well as for data retrieval targeted to later offline analysis.

The system offers extensive alarming features. Configuration and supervision is accessible by the Web application. Possible alarm types are relay switches, an Alarm & Control panel, mail, SMS or any other alarm possibility under Linux. R2D2<sup>®</sup> can also be controlled remotely and integrated in an SNMP-based supervision concept.

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