

# ECG

## EATM COMMUNICATION GATEWAY

# COMSOFT

# PRODUCT INFORMATION

COMSOFT's ECG is a new technology shaping up as the new standard for the future message handling services in the ATN. It is based on a comprehensive specification jointly elaborated by EUROCONTROL and the European member states.

Apart from ECG's capability to cope with all international and ICAO interoperability standards (ATN, CIDIN, AMHS, AFTN), one of ECG's strong points is its flexible message handling front end that can be easily customised to the user's individual needs. This guarantees a smooth adaptation to a wide range of operational environments at any Air Navigation Service Provider.

COMSOFT's, and therefore ECG's open-architecture approach to design and implementation implies a modular composition for both hardware and software. COMSOFT laid

particular stress on ECG's compatibility with standardised and well established commercial-of-the-shelf equipment, which is available at reasonable costs all over the world.

The ECG core software package is modular and platform-independent. Due to its excellent scalability and utmost upgrade and extension possibilities, ECG recommends itself for a COM Centre of any size - no matter what kind of requirements. Due to this flexibility, ECG will be able to keep pace with future developments and the requirements resulting thereof.

### HIGHLIGHTS

- Open, fault-tolerant architecture
- Exclusively based on COTS equipment
- Strict adherence to international and ICAO communication standards (ATN, CIDIN, AFTN)
- Strict adherence to ICAO message handling standards (AMHS, AFTN)
- Support of the European-Internet IP-based infrastructure (IPAX)
- Transparent switching of all kinds of aeronautical data
- High connectivity
- Customisable message handling front end
- Highly adaptable by online configuration
- Uniform, fully integrated HMI for all system functions
- Excellent throughput capacity



# SYSTEM ARCHITECTURE

ECG consists of three major parts which are coupled by a redundant Ethernet LAN: core system, recording system and operator working positions. All parts are based on COTS equipment and are highly scalable, independently from each other.

## CORE SYSTEM

- consists of duplicated core servers
- houses duplicated physical LAN/WAN interfaces for the connection to external communication partners
- executes LAN/WAN protocol stacks for the communication with all partner systems
- performs message handling and central routing functions

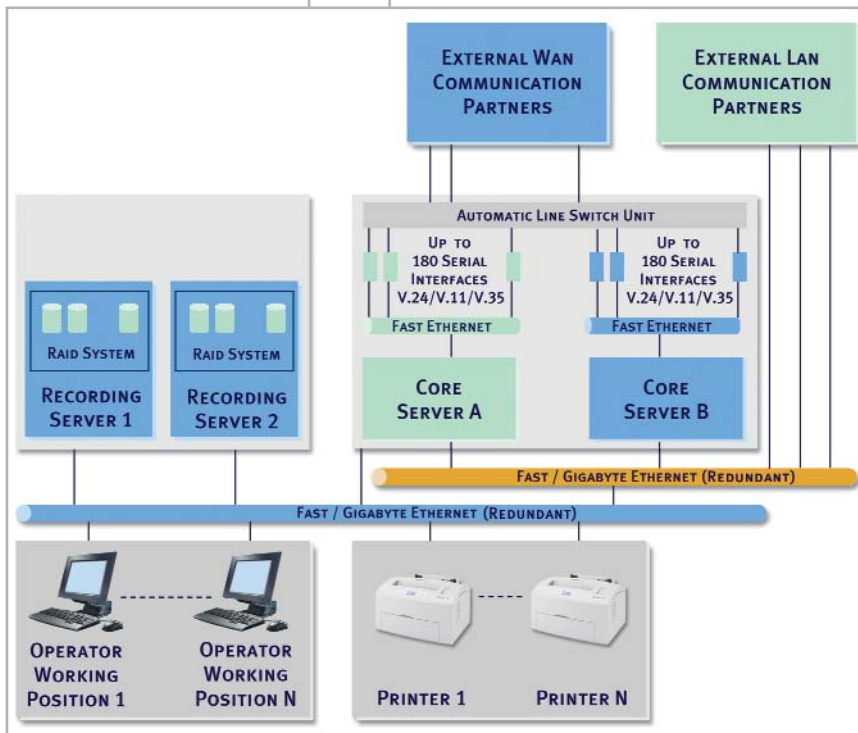
## RECORDING SYSTEM

- consists of duplicated database servers
- maintains temporary traffic, statistical and technical databases (storage period configurable)
- maintains static databases (system configurations, templates, other data)
- provides direct and "online" access to all databases
- allows several clients concurrent access to all databases by an unlimited number of clients

## OPERATOR WORKING POSITIONS

- offer distributed decentralised operation and supervision of the entire system
- are identical in HW and SW each providing full functional scope
- allow efficient access control by individually configurable user profiles
- provide simultaneous read access to all system resources
- guarantee consistency of resources during operation and reconfiguration by multiple users

System architecture



## REDUNDANCY

The best way to achieve system redundancy is to duplicate the system. The benefit of a duplicated system is the strict avoidance of single points of failure, e.g. the system has no shared HW/SW components integrated as typically used in standard cluster solutions available on the market.

COMSOFT's ECG solution masterly puts this approach into practice as it has all system components duplicated:

The core system has two identical communication units, which are operated in operational/hot standby combination. Both units mutually supervise their HW and SW.

The open message transactions of the operational unit are permanently mirrored in the standby unit, so that the standby unit is able to take over any time, typically in less than five seconds without loss of data.

The recording system has two identical database servers that are operated in parallel (mirrored servers). The update between the database servers is performed in the background without affecting the regular operation.

The system can be operated and supervised by up to 99 operator working positions that can be used concurrently. Each operator working position provides the full functional scope.

# FUNCTIONAL FEATURES

MSG TYPE	L 7	L 6	L 5	L 4	L 3	L 2	L 1
AMHS	X.400	ISO PRESENTATION	ISO SESSION	ISO TP4	ISO CLNP	ISO LLC1	10/100 BaseT
AMHS	X.400	ISO PRESENTATION	ISO SESSION	ISO TPO, RFC 1006, TCP	IP	ISO LLC1	10/100 BaseT
AMHS	X.400	ISO PRESENTATION	ISO SESSION	ISO TP0	X.25	HDLC	X.21/V11 OR X.21BIS/V28
AMHS	X.400	ISO PRESENTATION	ISO SESSION	ISO TP4	ISO CLNP, X.25	HDLC	X.21/V11 OR X.21BIS/V28
AFTN ATS FREE TEXT	SMTP	—	—	TCP	IP	—	10/100 BaseT
AFTN ATS FREE TEXT	—	—	—	ISO TP4	ISO CLNP	ISO LLC1	10/100 BaseT
AFTN ATS FREE TEXT	—	—	—	TCP, UDP	IP	—	10/100 BaseT
AFTN ATS FREE TEXT	—	—	—	CIDIN-LAYER-4	CIDIN-LAYER-3B, X.25	HDLC	X.21/V11 OR X.21BIS/V28
AFTN ATS FREE TEXT	—	—	—	—	X.25	HDLC	X.21/V11 OR X.21BIS/V28
AFTN ATS FREE TEXT	—	—	—	—	—	ASYNC. BYTE TTY	X.21/V11 OR X.21BIS/V28
MIB II TRAPS	SNMP	—	—	UDP	IP	—	10/100 BaseT

Connectivity

## EXTENDED SAFETY

COMSOFT's ECG is equipped with tools to manage software releases and to administer global system configuration data centrally. System parts (e.g. the core system) are automatically updated with all required data during the start-up phase. This offers the following advantages:

- Time-consuming and error-prone manual software installation and upgrade tasks on single system components are avoided.
- ECG allows decentralised architectures, e.g. two systems located at different sites can be managed centrally.
- The contingency management is most efficient as the switchover of the operational services from one site to another is a matter of minutes only.

## SYSTEM CONTROL & OPERATION

ECG incorporates a unique concept of integrating COTS products. As the data exchange between system components is harmonised by a standardised management interface, the system can be controlled and operated by one single uniform HMI.

## GUI FEATURES

- ECG provides a fully graphical, extremely easy and intuitive user interface.
- All functions can be used concurrently from several operator working positions.
- Apart from hierarchically structured dialogues and menus, a new object browser allows fast and direct access to related objects.

## SYSTEM PARAMETER HANDLING

- 99% of all system parameters can be changed "online".
- Hardware-related features, e.g. adding new interfaces or changing physical interface characteristics (V.24 ↔ V.11), are part of the

system parameters and result in zero-downtimes of the systems.

- Parameter input is menu-driven and facilitated by selection lists.
- Inputs are immediately checked on validity and cross-checked against related parameters, leading to a maximum of robustness against inconsistent user input.

## SYSTEM INSPECTION

Every two seconds, the system collects diagnostic values of all resources throughout all system levels:

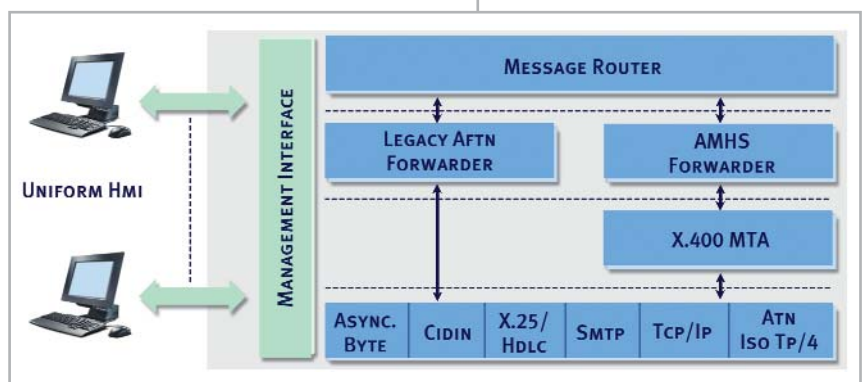
- system component states and resources
- message routing
- remote connection states and protocol-stack-related values (data line monitoring)
- system availability (sliding window of six months)

Based on diagnostic values, the system generates absolute, average, and peak statistics in different resolutions (minute, hour, day, month, year). All values can be visualised in tabular and graphical form (block diagram, charts, maps).

## EVENT AND ALARM HANDLING

- All changes in the system are reported and stored as events.
- Events can be configured individually with visible and audible alarm attributes.

System control & operation





## ROUTING & MESSAGE HANDLING

- ECG provides integrated AFTN and AMHS (ATS Message Server, AFTN/AMHS Gateway) message routing functions.
- Standard AFTN/AMHS routing functions can be extended by copying, redirecting and pausing messages. A flexible filter facilitates the message selection.
- ECG can act as a gateway by switching messages transparently.
- Received/transmitted messages can be monitored online per circuit.
- Pending messages in outgoing queues can be monitored online (per circuit), directly accessed and rerouted, redirected to other destinations, blocked, and removed. A flexible filter facilitates the message selection.
- Outgoing message queues are permanently checked on their length and whether they contain messages with an exceeded lifetime.

## MESSAGE DATABASE HANDLING

- The storage period is configurable (exceeding 30 days); it only depends on the physical disk space available. All data are accessible online (no distinction between short term and long term storage).
- ECG provides a unique and uniform message tracing function, which is independent from the message type, e.g. it is possible to retrieve an incoming AFTN message and to trace the related outgoing AMHS messages and vice versa.
- A flexible filter facilitates the message retrieval.

## CUSTOMISABLE MESSAGE FRONT END HANDLER

- ECG provides a flexible message front end handler that allows to link ECG with proprietary messaging applications simply by configuration.

- The front end handler allows to integrate ECG into any proprietary system environment.
- Air Navigation Service Providers can realise environment extensions and upgrades themselves without the need of external support.

## PERFORMANCE

- ECG is able to switch a permanent load of nearly 200 messages/second with an input/output ratio of 1:2 without effecting the quality of service.
- ECG protects itself against overload by applying extensive flow control mechanisms.
- Exceptional situations, e.g. a huge number of queued messages, caused by temporary outages, do not reduce the overall system performance.

## TECHNICAL DATA



### Core System

- Two Intel® processor-based, PC-compatible servers (rack-optimised)
- Operated in "operational/hot standby" configuration
- Up to 160 redundant WAN interfaces (V.24/V.11/V.35)
- Up to six redundant LAN interfaces (Gigabit/Fast Ethernet, FDDI)
- Linux Operating System

### Recording System

- Two Intel® processor-based, PC-compatible servers (rack-optimised)
- Operated in "mirrored server" configuration
- Each server equipped with high-volume storage systems
- Linux Operating System

### Operator Working Position

- Up to 99 Intel® processor-based workstations
- Linux Operating System
- X-Windows system, OSF Motif window manager

### Time System

- UTC-based using either DCF77 or GPS
- NTP time server or serial interfaces

### Throughput

- Permanent switching capability of nearly 200 messages/sec (inbound-outbound ratio 1:2)

### Maintenance Figures

- Availability: higher than 99,9997%
- MTTR: less than 20 minutes

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