CMS/XA

Control & Monitoring System –
Extended Architecture

The COMSOFT CMS/XA system represents an Integrated Control and Monitoring System for Air Traffic Control which is at the forefront of technology. An open architecture, high reliability and good performance paired with cost efficiency are its trademarks.

Based on state-of-the-art COTS technology COMSOFT's CMS/XA architecture represents a new generation of Control and Monitoring Systems (CMS). It caters for a world where flexible distributed availability of monitoring data, powerful event processing and expressive data presentation techniques are essential.

CMS/XA is an integrated architecture covering on-site data acquisition technology, remote communications as well as center-based processing and visualization equipment. Combined, it is ideally used to supervise a large number of remote sites simultaneously, e.g. radars, from one or several central locations.

Highlights

- Integrated CMS Architecture for remote sites and control centers

- Latest technology for data acquisition, processing and display

- Integrated CMS network based on ASTERIX standard

- Rule-based event processing

- Fast and flexible end-user customization
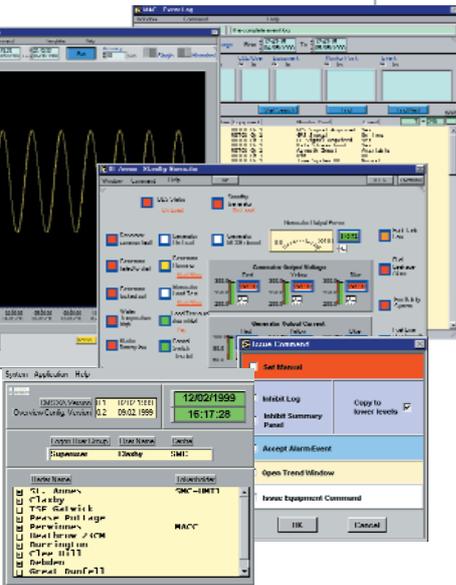
CMS/XA Screenshot

OPERATOR WORKING POSITIONS

- Clear, concise and expressive presentation of information
- Intuitive GUI handling by operator
- Wide range of display features for digital points, analogue points and complementary symbols
- Hierarchical computation and presentation of information
- Permanent status and summary panel
- Powerful event log and trend viewers
- Distributed operator logs, shared by all sites

ON-SITE DATA ACQUISITION

- Suite of serial line interfaces to intelligent site equipment (e.g. Raytheon Mode-S)
- Reliable and maintenance-friendly PROFIBUS field bus technology
- Wide range of available I/O equipment
- Optional GPS timestamping
- Deadbanding and nuisance alarm handling
- A/D conversion and alarming
- SNMP Acquisition

USER & SYSTEM COMMANDS

- Flexible remote command execution from operator GUIs
- Command status supervision (tellback and/or timeout)
- User-definable command procedures (incl. complex supervision conditions, conditional jumps, operator messages, etc.)
- Manualization possibility for equipment points
- Choice of several log levels

CMS CONTROL FUNCTIONS

- Inter-center token synchronization for exclusive remote site control
- Password-protected user roles and freely assignable privileges
- Extensive self-monitoring functions for all components
- Time distribution

SUMMARY PANEL FUNCTION

- Reporting of user-definable technical events to a summary panel
- Selective audible alarm triggering for new events
- Operator accept logic for new events
- External alarming

EVENT LOGGING

- Online data retrieval for configurable period of time
- Relational database search and find facilities
- Complex search conditions on event types and event parameters
- Storage and retrieval of search results
- Cascaded searches
- Archiving and export of event log in MS Office compatible form

TRENDING

- Trend database for analogue, digital and virtual points
- Live and historical trending
- Various scaling and zooming functions
- Stacked and overlaid trend charts
- Archiving and export of trend data in MS office compatible form
- User-definable trend templates

PORTABLES

- On-site access from each equipment room
- Remote dial-up
- Security control
- Full CMS HMI functionality

ENHANCED USER PROGRAMMABILITY

- Flexible, user-definable filtering and data abstraction features
- Separate configurability for data processing and display properties
- Automatic syntactical and semantical configuration checks
- User-defined contributor rules based on general boolean expressions (AND/OR/XOR/..) or truth tables
- Free design and placement of navigation hooks between windows
- Flexible definition of deadbands, alarm limits, reporting properties, etc.

CMS/XA NETWORKING PACKAGE

- CMS Wide Area Network Option for remote connectivity
- Dedicated CMS network or use of existing surveillance data networks (e.g. RADNET)
- Using ASTERIX Cat 253 standard for CMS data
- Compatible with COMSOFT's RMCDE technology
- Utmost flexibility, reliability and performance

SUB-CENTER FUNCTIONALITY

- Replication and distribution of filtered CMS data
- Flexible addressability
- Each sub-center individually configurable
- Support of control sharing with main centers

System Overview

CMS/XA represents a new generation of Control and Monitoring Systems. Based on advanced COTS technology such as relational databases, graphical user interface builders and network technology for the surveillance domain, the Control and Monitoring architecture excels with an optimum of scalability, reliability and openness to future extensions.

Open Architecture

The CMS/XA system follows a strictly modular design with separate components for data acquisition, data communication, data processing and presentation.

This provides high architectural flexibility and enables the system to accommodate to any existing site and communication infrastructure. N data acquisition sites can be connected to M control centers which themselves can provide data to several sub-centers.

The system provides many connectivity options ranging from dedicated serial lines to X.25 or TCP based wide area networks. For all the networking options the emerging international surveillance standard ASTERIX is employed.

Its category 253, dedicated to control and monitoring, provides further independence from proprietary manufacturer solutions.

Open acquisition technologies, like PROFIBUS, and a broad range of radar equipment specific protocols are offered. The system was designed to make the integration of new specific acquisition protocols an easy task.

Example Configuration
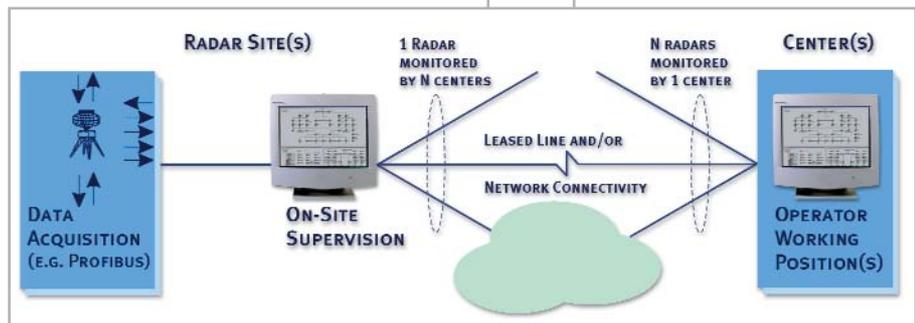
Scalability

CMS/XA is scalable from a local, single-PC based equipment to a fully distributed, integrated control and monitoring system with multiple data acquisition sites and multiple control centers and sub-centers. Connectivity scales from the use of a few dedicated serial lines to a country-spanning CMS Wide Area Network and an intra-center LAN topology.

Reliability

Designed particularly for ATC applications, CMS/XA heavily emphasizes reliability issues. This includes redundancy concepts for all its components on a hardware, software and networking level. Due to its modular architecture the system can be tailored to specified reliability requirements.
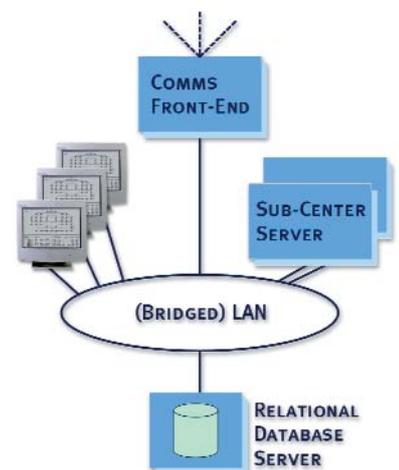
Ease-of-Use

Configuration changes by the enduser are no longer complex and error-prone, dealing with proprietary system details. With CMS/XA to include a new sensor or to modify an alarm condition, is as easy as editing a field of an underlying relational database. In the same way, designing a screen for data presentation only requires a graphics

editor for selecting and placing the respective symbols. Consequently, customization of a new radar site becomes a matter of days.

In addition, the CMS/XA's architectural distinction between processing and presenting elements of a configuration, enables design of different user interfaces for the same active system, e.g. for a main center and a sub-center.


LAN Option for Control Centers

Technical Data

HMI	- Windows-based workstation - High resolution display or dual screen configuration - National Instruments LabVIEW GUI builder - Scalable number of HMIs per center
Center Back-End	- Intel-based server - Alternatively DEC, HP, SUN database server (UNIX or Windows NT) with Intel application servers - Relational database (ORACLE) - Archiving medium: removable disk (optional DAT)
Radar-Site Data Acquisition	- Serial lines (synchronous/asynchronous) - PROFIBUS field bus equipment (Std EN 50170) etc. - Intel-based server - Single/dual PC configurations - 21" on-site terminal with full center capabilities
Radar-Center Connectivity	- Dedicated serial lines (2-line handling) - Dedicated CMS network (ASTERIX Cat 253) - Existing surveillance network (e.g. RADNET) - Protocols: HDLC LAPB, X.25, TCP/UDP/IP - Format: ASTERIX Cat 253 compliant
Intra-Center Connectivity	- Ethernet LAN (TCP/IP, ..) - FDDI LAN (TCP/IP, ..) - Serial Lines (HDLC LAPB, X.25) for detached HMIs
Center-Subcenter Connectivity	- Serial Lines (HDLC LAPB, X.25, ..) - Network connectivity - Configurable filters and data preprocessing
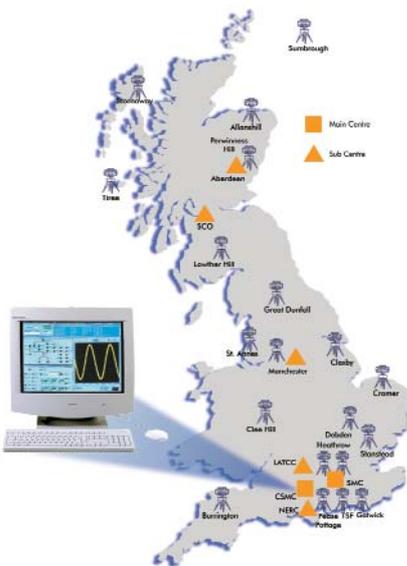
UK ERCAMS Project

Reference

As one of the most prominent references, CMS/XA forms the basis of the UK ERCAMS (En-Route Radar Control and Monitoring System). It implements an integrated Control and Monitoring approach covering all UK En-Route radars as well as the country's major airport radars. COMSOFT was awarded the contract by NATS in 1998 and has in the meantime successfully and on-time completed the program.

In the course of the ERCAMS project, more than 20 radar sites and 7 control centers were equipped with CMS/XA equipment. The contract also included the supply and installation of a country-wide CMS network, based on the new ASTERIX CAT 253 standard and COMSOFT's RMCDE technology, operational in over 50 installations across Europe.

With ERCAMS the UK NATS is now in a position to control all radars from its central Service Management Centre (SMC) in Swanwick. A contingency center in Gatwick, as well as several detached sub-centers also have monitoring feeds and can optionally control selected subsets of the radars.

The CMS/XA system's filtering and information processing features are extensively used in ERCAMS to present the user both a top-level view of the overall UK radar status, as well as the option to zoom into every single sensor of any of the connected radars. The flexibility of the system allows NATS to dynamically add new radars or upgrade existing configurations without disruption of the operational service.

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