

Si ATM Sys

”Cutting edge ATM system”

Si ATMSys supports Air Traffic Control operations for En-route (ACC), Approach (APP) and Tower (TWR) control. It was launched for operational use 1999 and has been incrementally upgraded with functionality in conformity with the European Convergence Implementation Plan, ECIP.

Si ATMSys has been designed for and proven to be

- flexible and configurable for most sizes of ATC systems
- easily expandable in size and functionality
- redundant in hardware and software
- cost effective in its life-cycle

Overview functionality

The following functionality is included in the Si ATMSys:

- Radar data processing with true multi sensor tracking
- Fusion of wide area Multilateration data with radar data
- Reception of ADS data for fusion with radar data
- Fully automatic flight plan data processing with route analysis and trajectory prediction
- Paperless and stripless controller HMI
- On Line Data Interchange, OLDI
- Recording and playback
- System monitoring and control with SNMP
- Medium term conflict detection, MTCDD



- Fully integrated Arrival manager, AMAN
- Technically advanced fault tolerant solutions built upon several levels of redundancy
- Radar bypass processing to handle emergency situations
- Safety nets, with STCA, MSAW, APW and APM (Approach Path Monitoring)
- Monitoring aids with conformance monitoring and reminder handling
- Integration with A-SMGCS systems
- Provision of departure clearance delivery by means of data link
- Strip printing functions on request

Flight Plan Data Management

Flight Data Assistants have an efficient HMI to support editing, browsing, queue handling with support for complex search criteria.

Handling of RPLs: RPLs can be searched, created, modified and Deleted manually, but also automatically based on airline time schedules on data media. Temporary changes and suspensions of flights are supported.

Handling of FPLs: FPLs are normally created automatically from RPLs or received from AFTN. They can also be searched, created, modified and deleted manually. Received AFTN and OLDI messages are processed and checked automatically and produce updates of concerned FPLs. Billing data is automatically submitted to external systems at FPL termination.

Route analysis: For RPLs and FPLs both, route details are examined against the local airspace structure for compliance with ICAO rules. The airspace structure is defined by means of system parameters.

Data Preparation handling: The system is easily adaptable to any operational environment by means of extensive use of system parameters.

Controlling Functions

The Human Machine Interface of controlling functions is window driven and suitable for one or two monitor configuration. It adapts to the latest recommendations of Eurocontrol concerning stripless HMI with extensive use of label and list interaction.

Main operational features:

- The functionality supports ACC, APP and TWR operations
- Flight data are presented, and operator interaction is performed, in labels and lists. Only the required data is presented. Additional data are easy to retrieve.
- The labels and lists are specially designed for a stripless environment.
- Various functions for silent coordination are available including coordination between TWR and APP.
- Each flight is dynamically updated based on controller input of clearances/instructions. Input facilities are available in any of a flight's HMI objects.
- Coordination with adjacent centers is performed by means of OLDI.
- The handling of the operational configuration is decentralized and flexible. It supports on-line redefinition of sector status.

ATC

Controller HMI. Controller interaction with flights is performed through extensive use of lists and flight labels.

Trajectory calculation. A trajectory describing the flight's path in airspace is calculated with consideration to aircraft performance characteristics and current weather data. Wherever applicable, SID or STAR is selected automatically. The trajectory's coverage of ATC sectors determines the distribution of flight data to working positions.

Surveillance data processing. Target data from PSR and SSR radar stations, Multilateration data and ADS data are processed by means of an advanced centralized true multi-sensor tracker. The resulting system tracks are associated with FPLs. Flight labels comprising surveillance and flight plan information are presented to controllers.

ATC tools. The following ATC tools are available: Monitoring aids, Medium-Term Conflict Detection, Short-Term Conflict Alert, Minimum Safe Altitude Warning, Area Proximity Warning and Approach Path Monitoring. They have been developed strictly in accordance with Eurocontrol specifications.

System redundancy

Mitigations of system errors and a high level of maintainability are achieved by:

- 1) Hardware redundancy on server level and communication system level
 - a) Fault tolerant servers, i.e. all computer components are duplicated and hot-swap changeable.
 - b) Servers and IO hardware are duplicated
 - c) Redundant LAN configuration, viz. all network parts are duplicated, including NICs in the individual computers.
- 2) Functional redundancy on the system level, i.e. the active server block can switch to the data-aligned stand-by server block whereas the controllers can continue to work. This concept can be used when changing hardware, software releases and parameters without interrupting operational use.
- 3) Optional Radar Bypass System with its own radar input channels and less functionality.

AIS data is received, processed, stored and presented to controllers.

ADS, CPDLC. Pre Departure Clearance, PDC is implemented by using a data channel between the ATC center and the Aircraft. Other CPDLC related functions are supported.

Recording and Playback. Data is continuously recorded. At playback, operational scenarios are recreated at a controller work position. Voice can be recorded on standard interfaces and synchronized with other data at playback.

System Monitoring and Control is performed by means of graphical presentation and tools for diagnostics and configuration control. Parameter changes can be made without interrupting operational use.

Event Analysis provides tools for technical analysis, traffic analysis, statistics and prognosis.

Strip printing is available on request.

Technical Features

Modern open system architecture

- Fault-tolerant software and hardware
- Distributed processing
- Functional blocks basically according to OASIS (Open ATM System Integration Strategy) by EATCHIP
- Non-dedicated workstations

COTS

- UNIX/Linux workstations
- Fault-tolerant servers
- Redundant LAN

Standard protocols are used and the application software is in C, C++ and ADA

Working position equipment

- Working positions with dual or single displays, selectable in size and resolution
- High-intensity TWR monitor
- Standard keyboard and 3-button mouse



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