

TAS

ATC Automation System

Tern Systems



System Overview

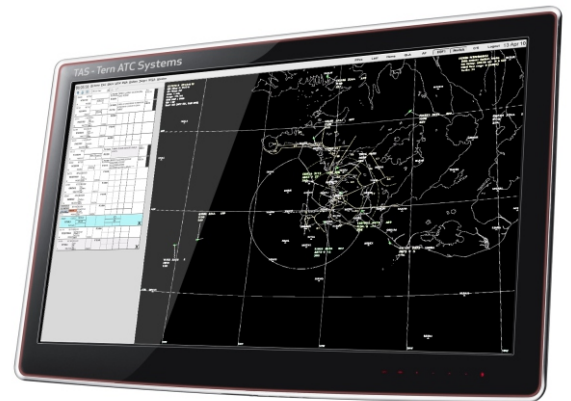
- Open system LAN-based architecture
- Commercial X86 processors (COTS hardware)
- LINUX operating system
- Standard communication protocols (IEEE-802.3, TCP/IP, UDP/IP)
- Color raster displays:
 - Rectangular or Widescreens of any size
 - High resolution: 2560 x 1600 and 2Kx2K pixels
 - Standard graphics: X-Window, MOTIF
- Advanced software language (C++), commercial databases (MySQL) and standard database access languages (4GL, SQL)

Full availability and back-up features are provided by the use of:

- Dual redundant servers
- Dual redundant LAN (Local Area Network)
- Distributed Radar Processing located at the working positions
- Proven high-performance hardware
- Proven software algorithms, with self-recovery procedures

Characteristics/benefits

- Proven system stability and performance
- Reduces technical and schedule risks
- Avoids premature technological obsolescence
- Ensures support longevity at reasonable cost
- Provides cost effective growth path
- Easy integration of Customer Furnished Equipment
- Avoids the need for hardware or software development
- Simplifies maintenance and support activities
- Streamlines system upgrade to satisfy future workload demands
- Provides a highly reliable system
- Reduces system downtime by providing redundancy
- Simplifies maintenance
- Simplifies maintenance and logistics activities
- Streamlines controller and maintenance training
- Permits midlife technology insertion without redesign
- New functionality can be added cost effectively
- Reduces the final cost of the overall system life cycle



Safety net functions includes:

- Short Term Conflict Alert (STCA)
- Minimum Safe Altitude Warning (MSAW)
- Danger Area Infringement Warning (DAIW)
- Approach Path Monitoring (APM)
- Cleared Level Adherence Monitoring (CLAM)
- Route Adherence Monitoring (RAM)
- Missed Position Report (MPR)
- Actual Time Over Monitoring (ATOM)



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System Components:

Flight Data Processing (FDP)

- Reception and processing of AFTN/ADEXP messages
- Validation and processing of flight plans entered from the FTN/IFPS or controller WP
- Management of flight plan (FPL) database and support of operator's actions
- Analysis of flight plan routes and calculation of flight trajectory and estimated times
- Assignment of SSR codes (domestic flights), SID and STAR procedures
- Distribution of flight plans to the SDP, controller workstation, strip printers and adjacent ACCs
- Handoff management
- Inter-centers coordination (OLDI, AIDC)
- Issue and transmission of AFTN messages
- Update of flight plan estimates provided by the surveillance data processing
- Monitoring aids (route conformance, SSR duplicated)
- Forecasting of potential intrusion into restricted areas.
- Flow planning
- Meteorological and aeronautical information management (MET)
- Recording of flight plans for further use in billing calculation and statistics
- Validation and processing of NOTAMs entered from the AFTN
- Airspace management (AUP/UUP maintenance and static, pre-tactical and tactical restricted areas management)
- Management of flow restrictions and slots
- PIP navigation window to display pictures, maps... between working positions (via Intranet)

Surveillance Data Processing (SDP)

- Radar data input processing and real-time quality control
- Monoradar and multiradar tracking and fusion
- Distribution of system tracks to external users
- Weather data processing
- ADS data processing and tracking (ADS-B and ADS-C)
- Flight plan functions (FP-track association, FP tracking, flight handoff, synthetic tracks)
- Redundancy and fall back

Safety nets

- Short Term Conflict Alert (STCA), prediction and violation of separation between aircraft in standard and RVSM (Reduced Vertical Separation Minimum) airspaces
- Minimum Safe Altitude Warning (MSAW), prediction and violation of altitude separation between aircraft and terrain
- Area Proximity Warning (APW), prediction and violation of incursion between aircraft and active protected area

Radar Data Compressor Unit-RDCU

- Communication front-end with different external radars and systems. RDCU can be dimensioned (modules, I/F channels) to meet customer needs in terms of number of radars and external users
- Support for all the functionality of conversion and distribution of radar messages for internal and external system
- Validation of radar messages in each of the radar native formats
- Conversion of any external to ASTERIX common internal format
- Distribution of messages to internal and external users over TCP/IP, HDLC and X25 protocols
- Independently configuration of filtering policies for every user
- Recording of all incoming data 24/7

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System Components:

Situation and Flight Data Displays (SDD/FDD)

- Display of system tracks (radar/ADS), radar plots, ADS reports, DF and weather contours
- Display of flight plan, coast and hold lists
- Display and graphic modification of flight plan route
- Display of aeronautical maps and restricted areas
- Graphic tools and local maps
- Display of auxiliary information (time, QNH, controlled sectors, sector assignments...)
- Display of MET information
- Access to flight plan database (retrieve, creation, modification and cancellation)
- Support of controllers actions (clearances, ATD, ARR and EST)
- Save/Restore of user preferences
- Control features of the local display (filters, off centering and range)
- Printout of flight strips (for non strip-less environments)
- Display of Short Term Conflict Alerts (STCA), Minimum Safe Altitude Warnings (MSAW), Area Proximity Warning (APW), CFL

Conformance Alarms (CLAM), and Route Adherence Monitoring (RAM)

- Playback of recorded data (playback mode)
- Correction/display/printing of AFTN messages
- Access to RPL, preliminary plan and SFPL database
- Access to MET/AIS databases
- Transmission of AFTN messages to external centers
- Display of traffic lists (flow planning)
- Management of flow restrictions, slots and NOTAMs

Data Recording Facility (DRF)

- Recording of radar, FP and ADF data as well as CWP status of all SDDs
- Save of the recorded data in local disk and optical medium
- Playback in any non-sectorized ASD
- Voice and data synchronization for playback

Control & Monitoring Display (CMD)

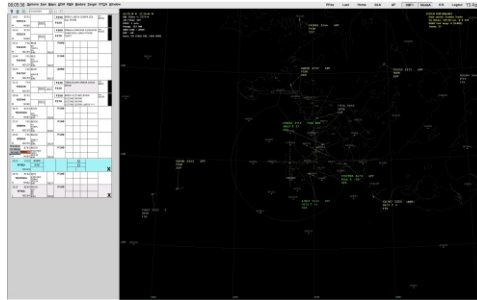
- Graphical display of the system layout, including external systems
- Display of system messages
- Listing of logged users
- System messages logged to printer and recorded on disk
- Complemented with a ASD configured to monitoring the raw plots and tracks received from the different radar sites
- Establishment of sector assignment
- Provision of configuration data to the Voice Communication System (VCS) upon sector reconfiguration such that the VCS and ATM system may be reconfigured in one action
- Radar configuration and radar statistics (RTQC of radar data)
- System statistics
- Configuration of system functions
- Change of VSP parameters
- System partial/global shutdowns/startups
- Equipment switchovers



System Components:

Data Base Management (DBM)

- Definition of the database with data adapted to the peculiarities of the ACC
- Setting of radar parameters (elevation, scan period, coverage, noise, radar format, etc.)
- Definition of airways, SID & STAR procedures
- Configuration of airports with its runways
- Navigation aids
- AFTN and OLDI addresses
- Sectors
- Adjacent centers
- Minimum altitude zones
- Aircraft performances
- Automatic generation of ASD maps
- Based on commercial databases and standard query languages (SQL, 4GL)
- Generation of informs and statistics
- Scalable for any need of reception and distribution of radar data Data Link Server - DLS
- Interface to the air segment for all Air Ground Data Link (AGDL) services regarding ADS/CPDLC messages
- Assignment of messages to the appropriate SDD, the SDP or the FDP
- Monitoring of the status of the data link connection to each flight and the operational procedures concerning specific flights
- Management of the communication with the external world, storing aircraft addresses, and conversion and formatting of message



Simulation Subsystem (SIM)

Simulation subsystem can be scaled from a full autonomous system (including capabilities for being a complete ATM backup system) to a software mockup for mainsystem support. It provides capabilities to training controllers in an environment replicated from the operational system, software test bed of the operational system, and operational system backup. To achieve this goal the simulation subsystem includes different controller positions, pilot and supervisor positions as well as a set of tools for the creation and evaluation of the training exercises, configurable for every application



Features:

- Modular and scalable
- Integrated Surveillance and Flight Data Processing
- Tactical and strategic control
- Conflict detection and resolution
- Variety of datalink solutions
- Positional recording and playback
- Automatic billing