ADR

All-Purpose Data Stream Replicator

COMSOFT

PRODUCT INFORMATION

ADR is an advanced and universal PC-based front-end processor for surveillance systems in heterogeneous ATC/ATM environments. Its highly flexible architecture makes it the perfect link between any kind of sensor and any kind of processing system independent of their characteristics and vendors.

ADR is a scalable, highly efficient surveillance message conversion and communication system. Its main task is the replication, filtering and processing of a wide variety of different radar formats and communication protocols. Additionally, ADR offers mono radar tracking for individual radar channels.

ADR is equipped with intelligent communication boards, such that in addition to all standard LAN protocols, also serial data streams are supported in a rich variety. The system architecture can be optionally extended to full redundancy, which guarantees an utmost degree of reliability.

Today, more than 50 ADR systems are in operational use in around 20 different control centres.

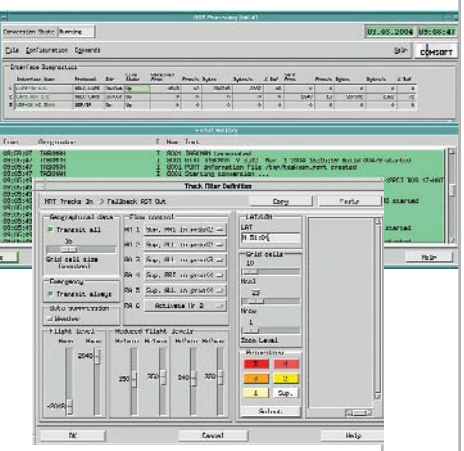
Highlights

- Wide range of supported data formats and protocols
- Powerful conversion and filtering functions
- Mono radar tracking per data stream possible (optional)
- Modular design and high adaptability
- Linux and Intel based server platform
- SNMP based supervision and control
- Mobile configurations (optional)
- Redundant architecture with hot standby features (optional)

Areas of Application

The systems are used in multiple scenarios and for different applications, e. g.

- as passive fallback system, taking actively over the supply of the fallback chain with surveillance data in case of a main system's failure;
- as front-end processor, adapting the surveillance data from radars located in neighbouring countries or from military radars;
- as communication gateway to allow the forwarding of data streams between serial lines and modern LAN architectures;
- as data filter, suppressing or sorting out certain data or message types;
- for re-formatting ASTERIX Mode-S surveillance data to ASTERIX classical PSR/SSR data;
- to convert native non-ASTERIX data formats into ASTERIX and vice versa.



Data filtering

Features

Data Distribution

- 1:n distribution of plot and track data from any source
- Real time transport with a minimum end-to-end delay (< 40 ms)
- Wide range of supported LAN/WAN interface types and protocols
- Intelligent passive listening on data lines (e.g. HDLC-LAPB) and further processing/distribution of data
- Supervision of external data lines (timeout, modem failure, protocol supervision) with automatic take-over

Conversion

- Conversion of sensor plot, sensor track, and multi-radar data between a large number of civil and military formats
- UTC time stamping/calculation of original plot detection time
- Support of latest ASTERIX standards
- Support of custom-specific ASTERIX applications
- Easy expandable with conversion modules for legacy interfaces by object-oriented architecture

Time Synchronization

- UTC time processing (NTP, GPS, DCF77)
- Automatic selection between various time sources possible
- System can act as NTP Server (stratum 1) within NTP networks

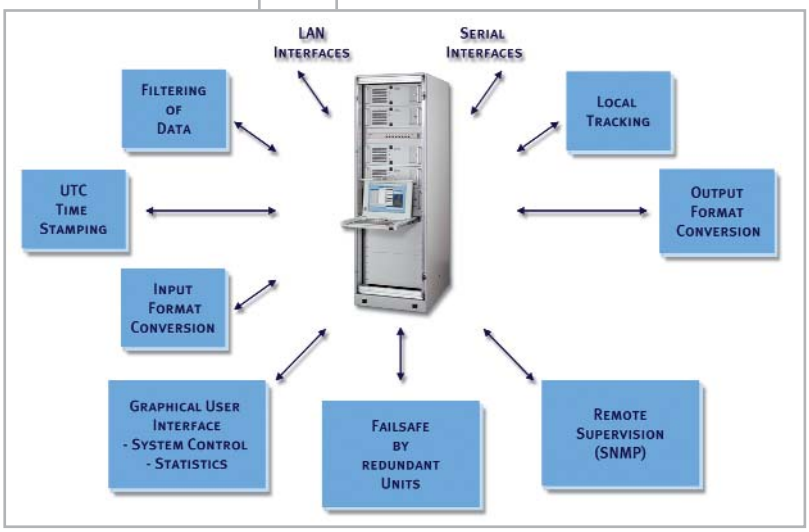
Tracking

- Mono radar tracking for any number of data streams
- Tracking parameters can be tailored individually according to user needs
- Coasting in case of detection misses

Filtering

- User-definable filtering for plots and tracks
- Message type filtering
- Message attribute filtering
- Weather filtering
- Import of RMCDE filters possible

Scope of Functions



Control / Supervision

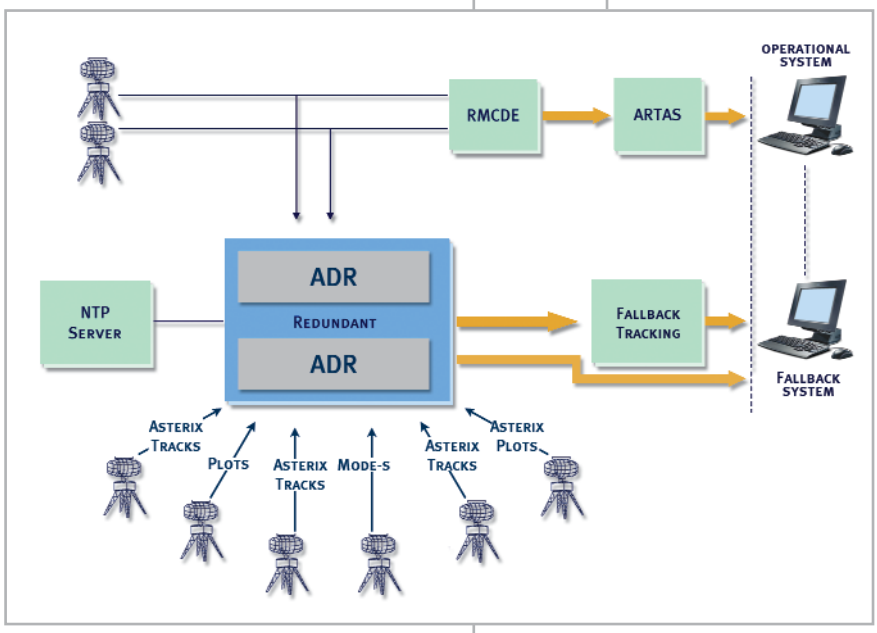
- High-resolution graphical user interface with X-Windows/OSF-Motif
- Access control (login user/password) with different access levels
- Context-sensitive online help
- Possibility to run graphical user interface on remote PC connected via LAN (degraded solution)
- Supervision and control via SNMP offering a detailed enterprise-specific MIB
- Configuration management via import/export functions

Diagnostics

- Detailed diagnostics for each interface: connection status, throughput, protocol errors, etc.
- Conversion diagnostics (per data stream): message types count, invalid messages
- Mono radar tracker diagnostics (per data stream): number of tracks, coasted tracks, terminations
- Filter diagnostics (per data stream): messages in/out
- Load diagnostics per data sink
- System message logging

Architecture

- Intel-based server technology
- Highly scalable interface technology
- High performance by use of intelligent communication boards
- Optionally redundant configuration with hot standby features
- LINUX operating system with X-Windows and OSF/Motif
- Open architecture, easily expandable object oriented software design



Application scenario

Deployment

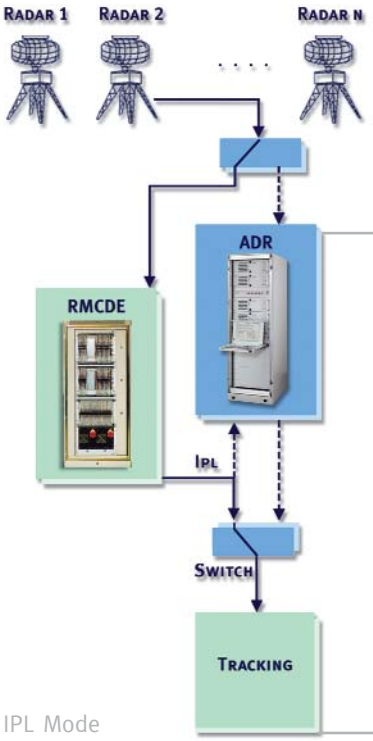
The hardware platform can be chosen depending on given circumstances and the spatial requirements on site.

Thanks to its extreme scalability and the use of standard components, ADR can be hosted on many different hardware platforms.

- The standard ADR solution is integrated into one single cabinet including the keyboard and mouse in a drawer, a KPM switch and an TFT monitor which can be integrated in the drawer with the keyboard. The ADR units are based on 19" rack-mountable servers.
- The common off-the-shelf components of an ADR can also be implemented into the customer's existing cabinets.
- The portable version is available with integrated communication boards for mobile application.

Technical Data

Interfaces	Serial Interfaces: up to 99 (V.24 or V.11) LAN: up to five (10/100/1000 Mbit/s, Ethernet, FDDI)
Formats	ASTERIX, AIRCAT, CD2, RDIF, RDE, EUROCONTROL, RLD, ALENIA, SVE, various military formats (additional formats on request)
Protocols	UDP/IP, TCP/IP, LLC1, TP4, X.25, HDLC-LAPB, HDLC-FRAME, AIRCAT, CD2, RDE, EUROCONTROL, various proprietary protocols
Time Services	NTP, GPS, DCF-77, crystal backup
Supervision	Integrated HMI, SNMP V1.0 with Application MIB
Availability	single 0.9993 redundant: 0.99999996
Throughput	› 5000 plots / s
Delay	‹ 40 ms



IPL Mode

The Concept of IPL Mode

As fallback system, ADR is operated in its Intelligent Passive Listening Mode (IPL). It is then physically decoupled from the operational line but nonetheless able to retrieve all radar data that is being exchanged. For bi-directional protocols like HDLC LAPB, this requires correct interpretation of the protocol being run, i.e. the detection of retransmissions and link resets between the active partners. The IPL mode ensures that the fallback systems receive all radar messages exactly once and in the right order. Every ADR unit can supply multiple fallback systems, each providing the individual format, protocol and line characteristics it requires, including separate pre-filtering for every user.

References

Today, more than 50 ADR system are in operational use in around 20 different control centres. Some of the more typical operational use cases in these centres are described below:

- Fallback component: In case of the main systems's failure, ADR actively supplies the fallback system with data and converts Mode-S radar data into ASTERIX CAT1/2.
- ASTERIX communication gateway (X.25, UDP/IP)
- Mobile data integrator (HDLC-Frame, LLC1, UDP/IP) and conversion system (RDIF) in connection with an analysis tool for flight inspections
- ASTERIX communication gateway (FDDI, Ethernet), also converting ARTAS system tracks into a legacy data format
- Front-end processor and tracker to supply of the fallback system using AIRCAT-500 as well as ASTERIX data converter to feed the ARTAS tracker with standard ASTERIX data
- Front-end processor and data conversion system for the country-wide distribution of surveillance data
- Front-end processor/conversion system for the integration of foreign radar sensors into the main system

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