

High Performance Security System for Belgocontrol



Radar Fallback System RFBS

Developed for Belgocontrol's National Air Traffic Control Center



Belgium's airspace, at the heart of many crossroads of airways, is one of the busiest and most complicated in Europe. In order to ensure safety and smooth handling of constantly growing air traffic, Belgocontrol decided for a technical upgrade of its Computer Assisted National Air Traffic Control Centre (CANAC), operational since 1993. Latest software technology for air traffic controller information plays a key role within this modernization.

Software from Barco Orthogon AG at the core of CANAC Upgrade

Barco Orthogon AG, who has been working successfully in air traffic control technology for more than fifteen years supplied an independent radar fallback system (RFBS) as one of the most important updates of the new system architecture. The RFBS system provides more safety and complete system control.

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System control at the highest technological level

Adding new safety facilities and reducing risks with RFBS

When Belgocontrol selected Barco Orthogon AG at the end of 2001 for developing the new fallback system, they decided for a phased approach reducing risks with stepwise introduction of new software features. Using the pre-developed systems and components of its OPS Center Barco Orthogon AG was able to realize the required elements in a short period of time, so that they could be inserted quickly at the different locations.

The RFBS is a distributed system; it is not only installed at CANAC center in Steenokkerzeel, but also at the towers of Brussels airport and in a later step at the regional airports of Liège, Charleroi, Oostende and Antwerp. The main servers are located in the technical room at CANAC center; the controller working positions (CWP) and the supervisor positions are in the OPS room. A separate helpdesk position for administration of the whole RFBS is also available. Training positions made it easy for the controllers to get familiar with the user-friendly handling of the RFBS system. A small test system comparable with the operational environment is used to evaluate adaptations and modifications before integrating them into the operational system.

The regional airports will be directly connected to the equipment at CANAC center with a WAN connection (wide area network). They receive the radar and system coordination data from the same servers as the CWPs at CANAC.

Every input whether done at CANAC, the towers, or at the regional airports is immediately distributed to all CWPs of the RFBS.

The whole system uses cost effective COTS standard PC hardware. As operating system Linux was selected. This combination allows easy hardware upgrades, extension for additional working positions, and maintenance.

For comprehensive overview, the RFBS system supports integration of up to twelve associated radar sources like local radars, ARTAS, or MADAP. Data can be delivered in different message formats, e.g. ASTERIX and AIRCAT 500.



In addition to the CWPs the RFBS provides a supervisor position with sectorization tools to define new configuration plans and display of all radar data and alerts. The supervisor surveys the application settings and monitors all aspects related to System, Monitoring, Control, and Failover (SMCF), another OPS Factory component.

Besides the CWPs and the supervisor desk the RFBS includes a helpdesk position where new configuration plans and adaptations can be made and distributed. This position also offers the possibility to actively control the system via SMCF. Finally, there is an offline configuration position for specifying the global settings and creating or modifying master configuration plans containing the default settings of the CWPs.

For accurate fault location, all applications are permanently controlled and monitored by SMCF. In case of crashes, processes are automatically restarted or reassigned to back-up hardware in case of hardware crashes. All critical subsystems as well as the SMCF manager process itself are redundant.

The RFBS system also includes a Recording and Playback System (RPS) based on the RAP feature of the ODS Toolbox, the standard software development tool of Barco Orthogon AG. The RPS takes care for recording all radar data and user actions performed at the working positions, thus allowing later analysis of emergency situations. Recording is done at all CWPs, supervisor, and helpdesk positions. Recorded sessions can be replayed at a specific working position. For the regional airports a local playback position is planned. At CANAC recordings from all sites can be replayed.

In December 2002 the interim system with 25 workstations received the official acceptance and is operational since July 2003. The final system will comprise about 90 workstations at CANAC Center (more than 570,000 en-route movements in 2001) including the newly planned tower at Brussels airport (305,000 movements), and at the four regional airports (more than 200,000 movements altogether).

The RFBS supports the high reliability of the whole CANAC surveillance system, providing the safety of uninterrupted operation to the ATC controllers.



An ideal fallback system for Controller Working Positions

Utmost security with a set of interlocked software components



Multi Track Correlation

Tracks are correlated from multiple radar sources and then be represented as one logical track. Operations performed on a particular track are automatically done for all other sources, too. The controller can switch between different radar sources and choose online the radar, which delivers best data for the controlled sector, or change it in case of radar failures.

Callsign association

The tracks are associated with flight plan information delivered by the CANAC FDP. The association algorithm cooperates with the multi track correlation. Flight plan related information like callsign, cleared flight level, and wake turbulence category are received from the FDP but can also be changed by the controllers manually.

Integrated Recording and Playback

Interactions at all positions are recorded by the Recording and Playback feature. The recording data is stored on a central storage device at CANAC center. The regional airports have their own recording equipment in order to reduce the amount of data transferred between CANAC and the airport. Each site is equipped with its own playback position. The playback station at CANAC is able to replay data from all sites by importing them directly if necessary. Long-term archiving on CD ROMs is also available at each playback position.

System Monitoring, Control, and Failover (SMCF) for Surveillance

The SMCF component secures all software and hardware processes and reacts on different system failures: in case of a software failure, the application is restarted immediately on the same hardware; in case of a hardware failure, all applications are restarted on a backup server. SMCF is also used to administrate the whole RFBS from the helpdesk at CANAC.

Radar Data Distribution

A central process is responsible for distribution of radar data received from external radars and the RADNET. This process validates each message and distributes it to all positions of the RFBS. Corrupted messages are deleted and not forwarded. This allows central validation of all incoming data streams and generates alerts in case of illegal or corrupt data.

Alerter and Logger Tools

In order to inform supervisor and helpdesk personnel about problems occurred in the system messages are displayed within a special tool called Alerter. It shows all active alerts and offers the possibility to acknowledge them individually to keep the overview of new incoming messages. A solved erroneous situation automatically inactivates the corresponding alert giving the user an overview of raised alerts that occurred but are no longer valid. In addition to the Alerter a tool displaying all logging messages from all positions is displayed at the helpdesk. This Logger gives an overview of messages, whether they are errors, warnings, or information, generated by each process in the system. It can also be used to browse through archived log files.



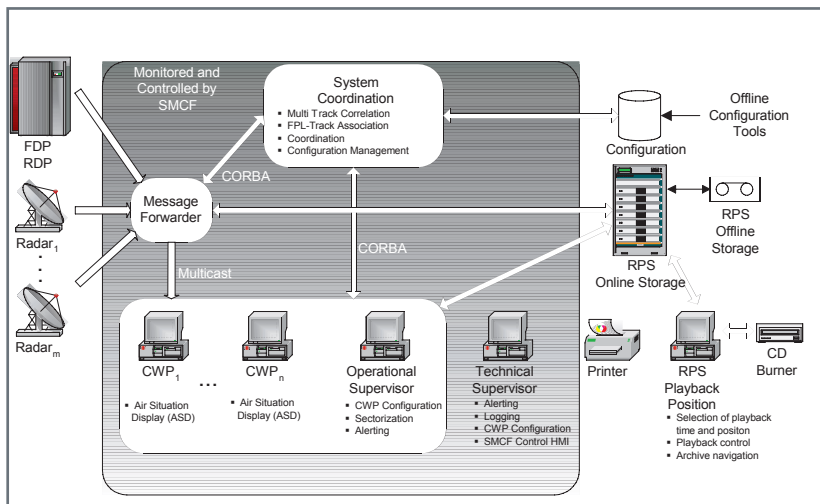
Technical Specifications

Technical features

- Up to twelve independent radar sources with up to 250 tracks each
- Track/Callsign association
- SMCF based on SNMP (Simple Network Management Protocol)
- Integrated Recording and Playback System (RPS)

Hardware requirements

- Standard COMPAQ PCs
- NEC 21" Flat Panels
- RedHat Linux Distribution



RFBS System Architecture

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Barco Orthogon AG offers sophisticated software tools and solutions for mission-critical applications in the fields of Air Traffic Control, Vessel Traffic Services and Command and Control. It maintains offices in Bremen, Stuttgart, Frankfurt (Germany), Paris (France) and a subsidiary in Smithville, New Jersey (USA).

Ref. RFBS 01-01 - Oct '03

Application notes are subject to change without prior notice

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