



# SAM Trackside Signalling Maintenance System

SAM is CAF Signalling solution for a comprehensive trackside signalling system maintenance.

SAM allows the gathering of diagnosis information from all kind of trackside signalling products (interlockings, ERTMS, etc.) aiming to show real time status of the equipment and field elements. SAM is able to display raw and processed information using various layouts and formats to ease maintenance tasks.

*CAF Signalling is a world reference in the design and implementation of rail control solutions for the railway industry.*

## TECHNICAL FEATURES

### Architecture

The SAM's suit of products have been designed to offer different functionalities depending on the project needs.

- **SCOM:** In charge of acquisition and storage of diagnosis information directly from signalling products, this CENELEC SIL2 product allows a redundant active/active architecture optionally. SAM and JRU need SCOM for raw data gathering in a lower level.
- **Local & Central SAM:** After receiving data from the different trackside signalling products through SCOM, these products show relevant information for the maintenance of those systems to the final user.
- **JRU:** This CENELEC SIL2 developed product implements specific juridical recording functionalities.

### Layouts

Local & Central SAM are able to show relevant information in different aggregation levels and formats: dashboards, communication networks, operational synoptic, several housing perspectives, etc.

The screenshot displays the SAM software interface. At the top, there's a navigation bar with 'odif' and 'Sincronización' buttons, and a user profile 'sam'. The main area is a dashboard with several equipment status cards. Each card shows the equipment name, state (e.g., 'Estado: 1'), number of alarms, and communication status for three different paths (Estado via 1, 2, 3). It also includes technical details like 'Fecha', 'Versión SW', 'Nombre CFG', 'CRC CFG', and 'SAI'. Below the dashboard is a table with columns for 'Fecha y Hora', 'Equipo', 'Tipo objeto', 'Objeto', 'Descripción', and 'Ficticia'. The table lists various events and their details. At the bottom right, there's a 'Total: 174' and 'ACK ALL' button.

Fecha y Hora	Equipo	Tipo objeto	Objeto	Descripción	Ficticia	Reco...
2020/01/28 08:23:20	S3e-62MCS	CSE	CSE_ELB3	CSE_ESTADO_GENERAL_comNoEstablecida	Si	✓
2020/01/28 08:23:15	S3e-62MCS	CSE	CSE2	CSE_ESTADO_GENERAL_comNoEstablecida	Si	✓
2020/01/28 08:23:10	S3e-62MCS	CSE	CSE4	CSE_ESTADO_GENERAL_comNoEstablecida	Si	✓
2020/01/19 06:00:30	ENCE_ELR	SE	E2R	SE_FUNCIONAMIENTO_averia	Si	✓
2020/01/19 06:00:30	ENCE_ELR	SE	E2R	SE_VIGILANCIA_FOCOS_apagadoCorrienteEnc	Si	✓
2020/01/19 06:00:30	FNCF_RJR	RF	RF4	RF_FUNCIONAMIENTO_averia	Si	✓



## Playback

Local & Central SAM handle the information in a way that allow the playback of past events using the operational synoptic layout. Thus, the final user is capable to analyse the sequence of alarms and events occurred in a certain zone of the line.

## Alarm management

This feature presents real time alarms, or gives the possibility to search for a concrete alarm or event occurred in the past. Generation of alarm and event statistics is possible too in a graphical manner.

## Reports

SAM is able to generate reports like: active alarms, filtered list of events, status of key variables of the system, executed maintenance commands, list of existing software version and data configuration version in supervised equipment, etc.

## Maintenance commands & services

Some maintenance-related actions are possible to be commanded from SAM HMI by the user, like: operational counters management, movement of switches and points due to maintenance activities in coordination with control centre, signal normalization after maintenance intervention, download of JRJ, etc.

## System master clock

Optionally, the SCOM can behave as system master clock synchronizing all the products under supervision using NTP protocols.

## Remote access

Once the SAM is installed, a remote connexion using a light client from any other PC in the network to check maintenance information is possible.

## Users & profile management

The access to the SAM application is controlled by security mechanisms, able to manage users and profile types. This way, access to the different information areas and functionalities depending on the user and its profile is ensured.

## Project specific data prep

A project specific customization layer allows SAM to be flexible and be adapted to every client and project specificities. This specific configuration is developed and tested in laboratory before commissioning.



## BENEFITS & ADVANTAGES

### Comprehensive maintenance solution

SAM gathers and organizes maintenance information from all CAF Signalling products in one single homogeneous application. The harmonized look and fell and its user-friendly interface allow an easy and short learning process for the maintenance user.

### Scalability & adaptability

SAM's software is designed to allow an easy extension of the number and type of supervised products, not requiring software configuration changes when an already supervised product increases the number of elements of a certain type (eg. IXL sending new signals information).

### From corrective to condition-based maintenance

Corrective, predictive and condition-based maintenance functionalities are implemented in the SAM. These functions allow a better coordination of maintenance actions, and the optimization of field elements' life cycle.