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RIMON monitors the integrity of Railway Infrastructure.

It allows monitoring the mechanical stress state and the temperature of the rails to prevent rail buckling or breaking due to temperature changes, ballast or infrastructure degradation.

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The system collects data from multiple measuring points and convey them to a central place where alarms are displayed in case pre-defined thresholds are exceeded.

For this reason, the system can be installed at all the critical points of the line.

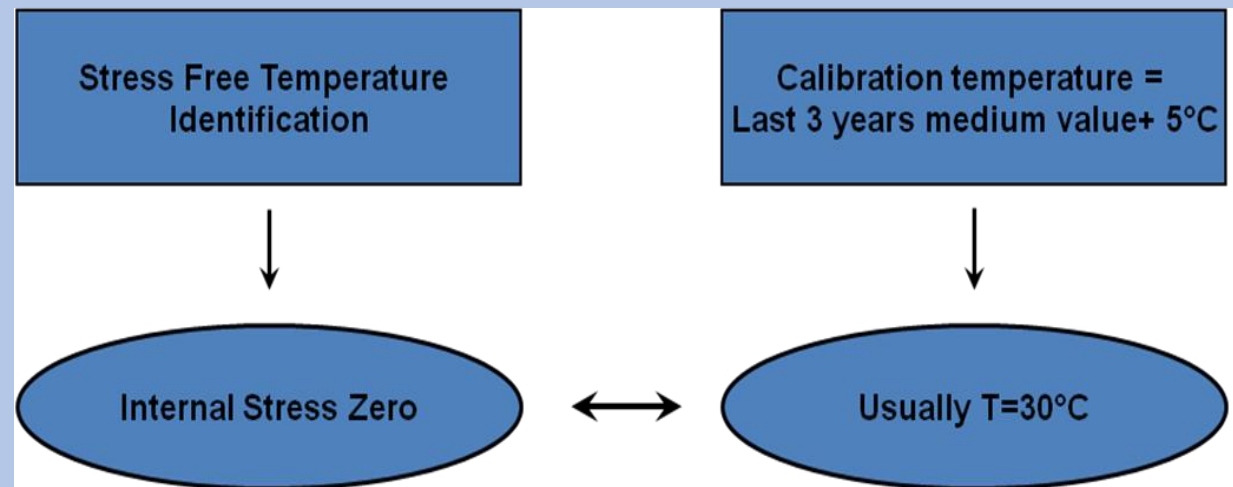
Installation is simple and does not require any specific interventions. The measuring points can be powered locally using long life batteries or solar cells where power supply is not available.

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Stress Free Temperature (SFT)

At Stress Free Temperature the rail mechanical stress is zero. This is also called “neutral temperature”.

The SFT value has to be constant: the measured SFT must be periodically set equal to the theoretical stress free temperature (usually 30° C) by mechanical calibration.



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Functional Specification:

- Verify the relationship between stress and temperature;
- Calculate the real time stress free temperature, check if it is constant over time or not, compare it to the theoretical value;
- Manage alert/dynamic_alarm thresholds, depending on the real stress free temperature;
- Provide support to the rail calibration, both in the choice of the STF value, and during the real calibration operation phase.

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CONSTITUENTS

RIMON modular architecture, shows the following essential constituents :

- Measuring Devices (MD) based on sensors installed on the rail surface and all the equipment needed for the data acquisition and the wireless transmission;
- Wireless Transmitter (WT) which collect data acquired by a group of MD (according to the wireless coverage area) and send them to the Supervision Centre (SC);
- Supervision Centre (SC). RIMON SW application runs on a Personal Computer at a Railway Supervision Centre to receive data from field, capture, process, store and make them available to the operator.

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Data Sheet

Input channels	2
Transducer type	Strain gage, PT100
Output signal	RS232, Ethernet
Power supply	18 , 36 VDC (Current absorption @ 100 mA @ 24 VDC)
Operative temperature	-40 , +80 °C
Housing	Metallic IP65 case
Dimensions	80 x 125 x 57 [mm] (glands excluded)

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SYSTEM ARCHITECTURE (Italy)

RIMON has a modular architecture allowing different choices based on Power Supply and Telecommunication needs.

We have two solutions used by:

1. Ferrovie Nord Milano

1. Power supply for both sensors and transmission by direct link to low voltage network
2. Data transfer to the Supervision Centre by direct link to available optical fiber network

2. Rete Ferroviaria Italiana

1. Power supply for both sensors and transmission by low consumption/long duration batteries and Solar Cells
2. Local wireless network to transfer data from a local set of sensors to a router/GSM local unit that sends data to the Supervision Centre

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SYSTEM ARCHITECTURE

RIMON modular architecture allows optimization of the implementation according to any existing railway.

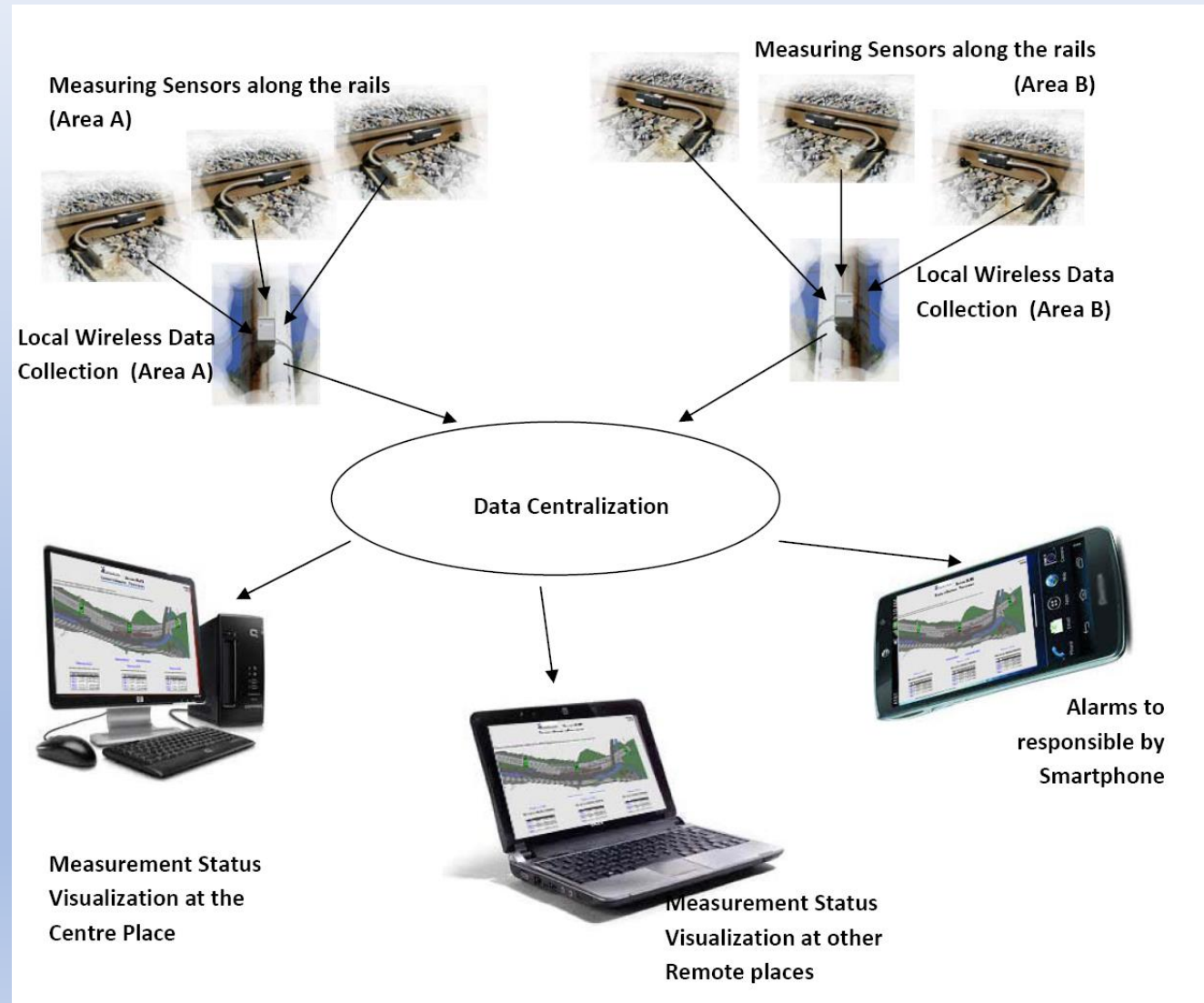
For instance, in an inaccessible and isolated area with no power supply availability, the GSM BYTS of the ERTMS could not be available for RIMON.

In this case the device has:

- A battery system with solar cells for the power supply of sensors and telecommunication stations
- Satellite communications.

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SYSTEM ARCHITECTURE

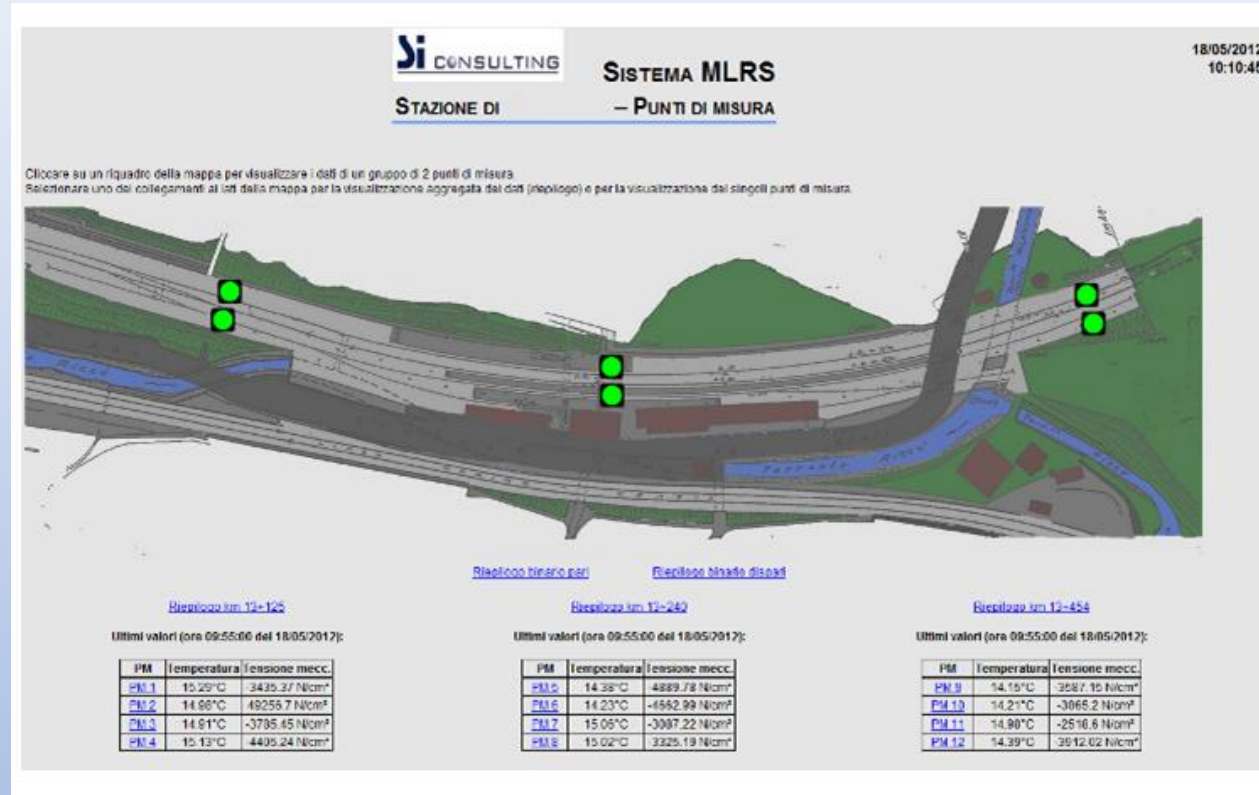


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SW at the SUPERVISION Centre

Main Features:

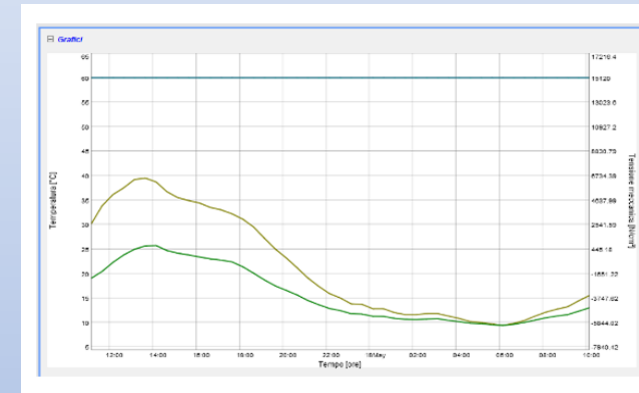
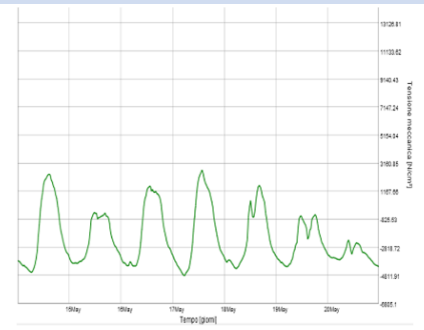
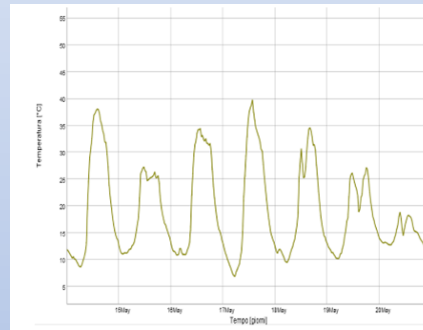
- Database of all collected data for further elaborations
- Statistical evaluation of all variables



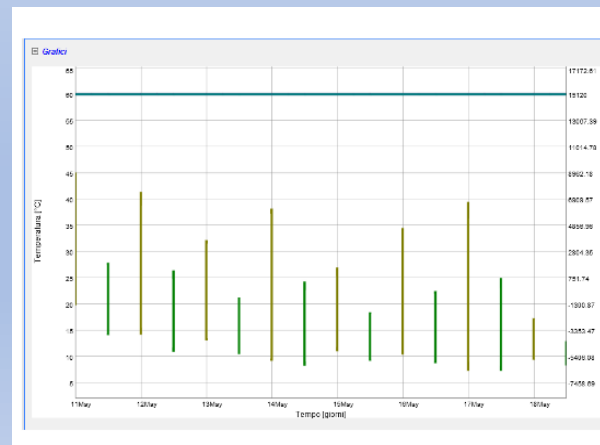
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SW at the SUPERVISION Centre

Data may be seen as daily graph, weekly graph or for a longer period.



Only max/min values can be shown. Excel table are also available.



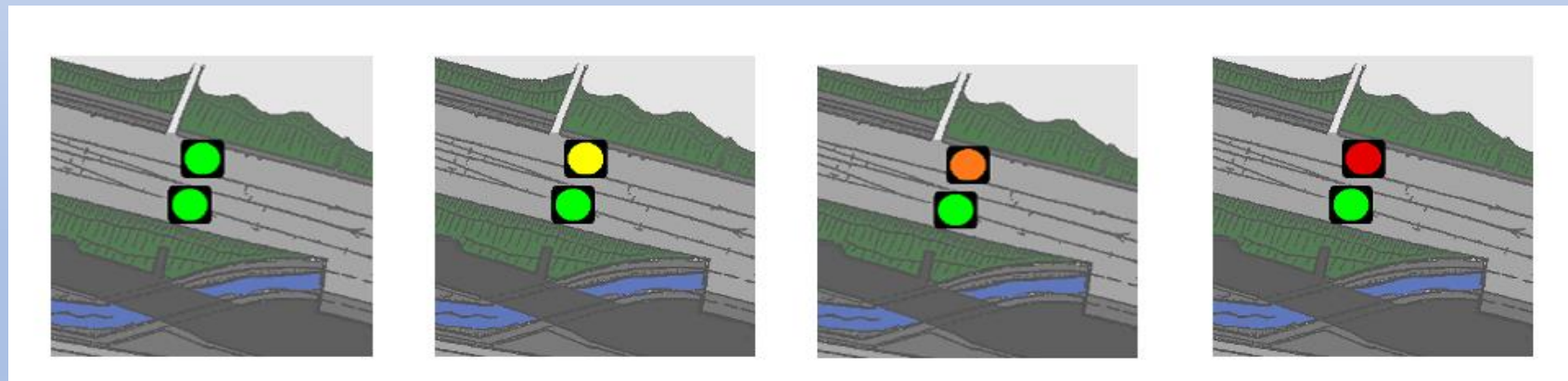
Orario	Temperatura [°C]	Orario	Temperatura neutra reale [°C]	Orario	Tensione meccanica [N/cm²]
2012-05-17 11:10:00	30.1	2012-05-17 11:10:00	38.2	2012-05-17 11:10:00	-2.1E+3
2012-05-17 11:40:00	33.8	2012-05-17 11:40:00	39.6	2012-05-17 11:40:00	-1.5E+3
2012-05-17 12:10:00	36.1	2012-05-17 12:10:00	38.9	2012-05-17 12:10:00	-7.1E+2
2012-05-17 12:40:00	37.5	2012-05-17 12:40:00	37.8	2012-05-17 12:40:00	-6.9E+1
2012-05-17 13:10:00	39.2	2012-05-17 13:10:00	37.5	2012-05-17 13:10:00	4.2E+2
2012-05-17 13:40:00	39.5	2012-05-17 13:40:00	36.7	2012-05-17 13:40:00	7.1E+2
2012-05-17 14:10:00	38.7	2012-05-17 14:10:00	35.8	2012-05-17 14:10:00	7.4E+2
2012-05-17 14:40:00	36.7	2012-05-17 14:40:00	35.4	2012-05-17 14:40:00	3.1E+2
2012-05-17 15:10:00	35.5	2012-05-17 15:10:00	35.2	2012-05-17 15:10:00	8.4E+1
2012-05-17 15:40:00	34.9	2012-05-17 15:40:00	35.1	2012-05-17 15:40:00	-6.2E+1
2012-05-17 16:10:00	34.4	2012-05-17 16:10:00	35.3	2012-05-17 16:10:00	-2.4E+2
2012-05-17 16:40:00	33.5	2012-05-17 16:40:00	35.1	2012-05-17 16:40:00	-4.0E+2
2012-05-17 17:10:00	33.0	2012-05-17 17:10:00	35.0	2012-05-17 17:10:00	-5.1E+2
2012-05-17 17:40:00	32.2	2012-05-17 17:40:00	34.8	2012-05-17 17:40:00	-6.6E+2
2012-05-17 18:10:00	31.1	2012-05-17 18:10:00	35.4	2012-05-17 18:10:00	-1.1E+3
2012-05-17 18:40:00	29.5	2012-05-17 18:40:00	35.9	2012-05-17 18:40:00	-1.6E+3
2012-05-17 19:10:00	27.2	2012-05-17 19:10:00	35.9	2012-05-17 19:10:00	-2.2E+3
2012-05-17 19:40:00	25.0	2012-05-17 19:40:00	35.7	2012-05-17 19:40:00	-2.7E+3
2012-05-17 20:10:00	23.2	2012-05-17 20:10:00	35.4	2012-05-17 20:10:00	-3.1E+3
2012-05-17 20:40:00	21.2	2012-05-17 20:40:00	35.0	2012-05-17 20:40:00	-3.5E+3
2012-05-17 21:10:00	19.1	2012-05-17 21:10:00	34.8	2012-05-17 21:10:00	-4.0E+3
2012-05-17 21:40:00	17.4	2012-05-17 21:40:00	34.6	2012-05-17 21:40:00	-4.3E+3
2012-05-17 22:10:00	15.9	2012-05-17 22:10:00	34.4	2012-05-17 22:10:00	-4.6E+3

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Alarm display

When a threshold is exceeded, an alarm is generated. It is displayed on the main page as a circular signal, which takes 4 different colors according to the alarm thresholds.

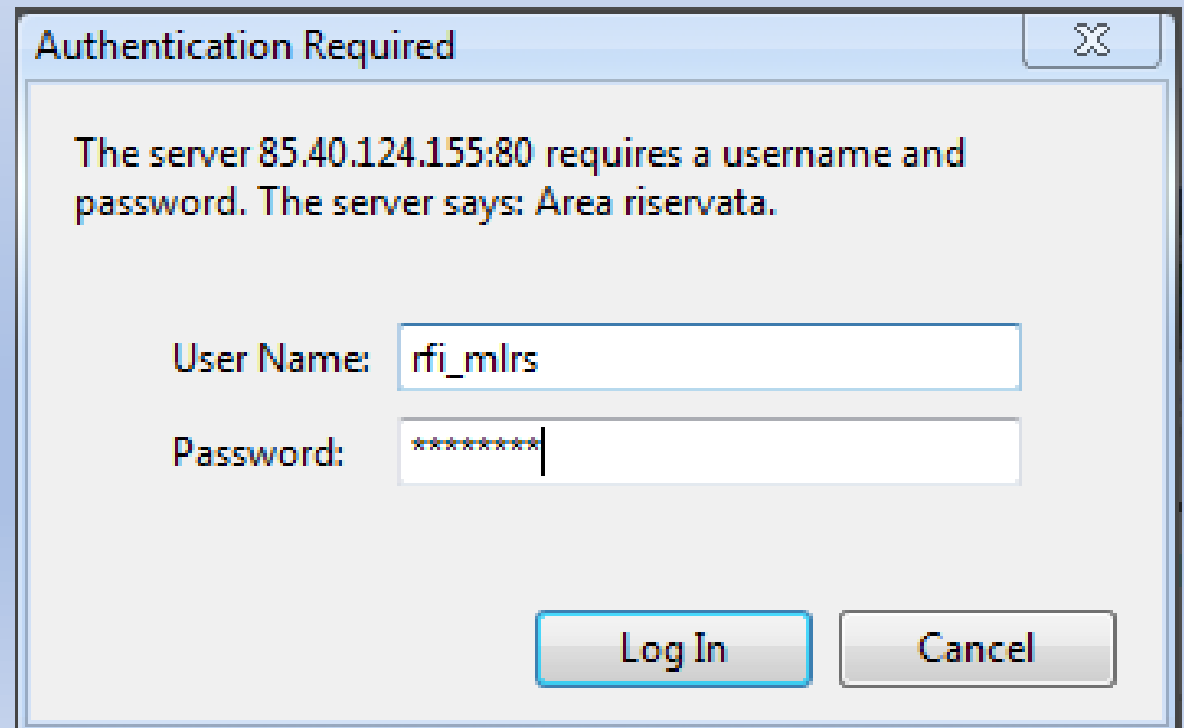


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SW at the SUPERVISION Centre

Remote access

The Supervision Centre is physically connected to a transmission network and can be remotely accessed. Access can be customized according to user and administrator level.

A screenshot of a Windows-style dialog box titled 'Authentication Required'. The dialog box has a light blue header bar with a close button in the top right corner. The main content area is white and contains the following text: 'The server 85.40.124.155:80 requires a username and password. The server says: Area riservata.' Below this text are two input fields. The first is labeled 'User Name:' and contains the text 'rfi_mlrs'. The second is labeled 'Password:' and contains a series of asterisks '*****' followed by a vertical cursor. At the bottom of the dialog box are two buttons: 'Log In' and 'Cancel', both with a light blue gradient and a thin border.