

Reference data

- Customer:
Terna Rete Elettrica Nazionale
- Sector: Power Transmission
- Country: Italy
- Project target: to set the highest level of standardization regarding engineering, protection and automation functions, communication interfaces and physical realization of the substations



The Project

The SICAS Standard (Sistema Integrato di Controllo e Automazione delle Stazioni elettriche – Integrated Control and Automation System for electrical Substations) project has the target to define and to standardize a new generation of command, control, automation, monitoring and protection systems for HV transmission substations, using the best available technologies and the most recent and notable international standards.

The main criterions inspiring this new standard are modularity, ease of operation and maintenance and capability of continuous upgrading.

The Standard is based on the existing SICAS 1, first generation digital automation system, and Terna is going to apply it for both new substations and upgrading/extension of already existing ones, if applicable.

The Customer

Terna owns and manages more than 98% of the Italian electrical transmission grid, which presently is made of more than 58,000 km of high and very high voltage lines (including SA.PE.I, the

deepest submarine cable in the world), with 371 transformation substations for a total amount of transformation capability of over 118,000 MVA. Terna is besides responsible for the power flow management on the whole national area and it is then called to manage a yearly requirement of electrical energy of approximately 340,000 GWh. Since it operates, Terna gives the greatest importance to the safety and to the reliability of the electrical system and pursues these aims through large investments and the continuous adoption of the best technologies.

The Requirements

The high level of standardization and modularity key targets of the project turns into the definition and realization of a set of typical functional units, able to perform any protection and command function that an electrical substation may need, at the present and in the future.

The supplier is then requested to be compliant with the most advanced technological standards (with a deep implementation of the IEC61850 protocol) and capable to realize a complete, modular and upgradeable solution.

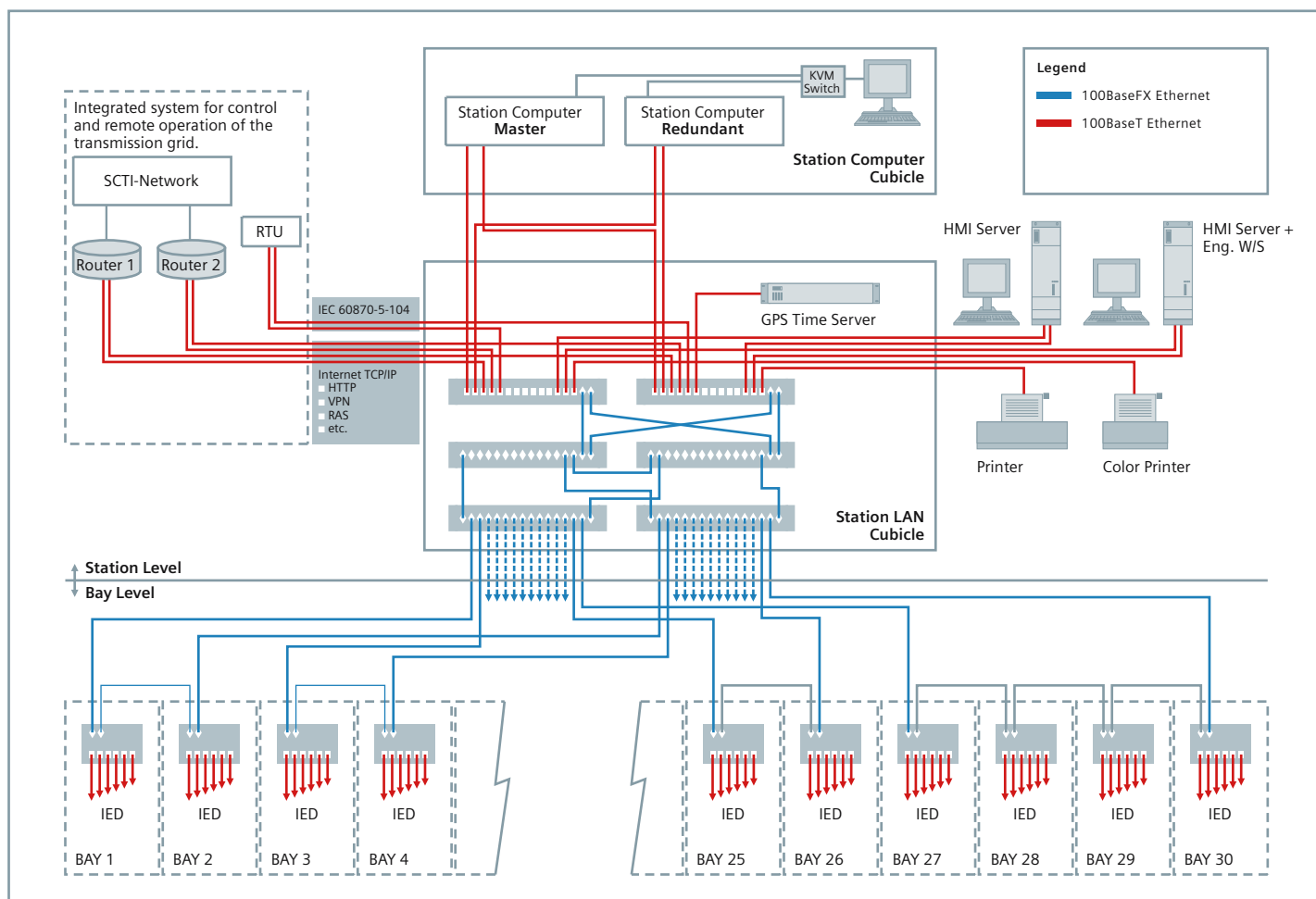
Terna SICAS Standard Certification

Integrated Control and Automation System for Substations

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Configuration

The Solution

Scope of Supply

The definition of the Functional Units and of the related requirements of protection, monitoring, command and control is given by Terna. Siemens offers for each of them the best solution:

- Protection, command and control numerical relays (bay level): SIPROTEC 4
- Automation and SCADA (station level): SICAM PAS
- Measures and fault recording: SIMEAS

Architecture

The substation architecture is based upon a redundant, multimode fiber-optics loop, which links the Ethernet switches in each panel. Inside each cubicle, the link between the Ethernet switch and the installed IEDs follows a radial scheme, with electrical connections. The communication protocol at this level is dictated by IEC 61850. Substation automation is ensured by a fully redundant SICAM PAS system, with two independent PAS Full Server, which

are configured in accordance with a hot stand-by logic. At station level are an HMI system (SICAM PAS CC, based on WinCC software), a time synchronization system (via GPS signal, with a NTP Server) and the necessary equipment for interfacing with Terna's SCTI Network (the centralized, integrated telecontrol and monitoring system): at this level, communication protocol is the one described in IEC 60870-5-104.

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Siemens AG
Energy Sector
Freylebenstrasse 1
91058 Erlangen, Germany

Siemens AG
Energy Sector
Power Distribution Division
Energy Automation
Humboldtstrasse 59
90459 Nuremberg, Germany
www.siemens.com/energy-automation

For more information, please contact
our Customer Support Center.
Phone: +49 180/524 70 00
Fax: +49 180/524 24 71
(Charges depending on provider)
E-mail: support.energy@siemens.com

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