

ELIPSE POWER AUTOMATES CPFL'S CRUZ ALTA SUBSTATION WITH IEC 61850 AND DNP3 PROTOCOLS

Elipse Software's solution provides rapid integration with equipment of the substation located in Olympia (SP), by using IEC 61850 and DNP3 protocols, thus eliminating the use of gateways or remote

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Needs

CPFL Energia is a holding company that operates in the Brazilian electricity sector, via subsidiaries dedicated to the segments of distribution, generation, energy marketing, and infrastructure services for electrical installations. Leader in the distribution segment with 13% share in the domestic market, CPFL group distributes power to a total of 7.1 million customers, serving 569 municipalities in the states of São Paulo, Rio Grande do Sul, Paraná, and Minas Gerais. In the service sector, where it has worked since 2002, the company has more than 2300 MVA Power Installed in Substations, and over 500 km of transmission lines, in voltage classes ranging from 13.8 to 230 KV.

Recently, the service trading company of the Group, CPFL Serviços, was hired by Guarani group to perform the suitability of a 138 KV substation, set as Simple Tap Sectioning, and to install and another transformation bay of 25/31, 5 MVA, 138 - 13.8 KV, in the city of Olympia (SP). This adjustment was necessary to meet the current laws, which require that plants co-generating energy be connected directly in bus substation or in transmission line, as long as it is in the sectioning configuration. This is the case of Cruz Alta plant, belonging to the Guarani group, as indicated in the connection studies.

In this context, the substation, which was previously exclusive used, monitored, and operated by the plant, now belongs to the transmission system of the local concessionary, being the responsible for its operation and monitoring. For this, it was necessary to install a Supervisory Control System (SCS), meeting the standards of the local concessionary, which in this case is CPFL Paulista, a company from CPFL Energia Group.

The full scope of CPFL Services comprised the supply and management of studies, projects, technical specification of equipment and systems, construction, commissioning, and energization of the substation, as well as the sectioning of the 138 KV Barretos - São José do Rio Preto transmission line, CPFL. Within this scope was the provision of a Supervision and Control

System capable of monitoring and controlling the equipment of Santa Cruz substation, which became part of CPFL's Transmission System, as detailed above.

Following this context, CPFL Serviços decided to adopt Elipse Power, a solution dedicated to the power sector that is able to communicate via the DNP3 and IEC 61850 protocols with different substation devices (protective relays, circuit breakers, transformers, etc.). From this rapid integration, the software transmits all the information about the current status of each of these devices to CPFL's System Operation Center (SOC), headquartered in Campinas (SP), and to the operating room located next to the substation itself, in Olympiaia.

Besides monitoring, Elipse Power enables sending remote commands to the relays via CPFL's SOC or via the substation's operating room. Also important to this project is the participation of AFAP Eletro Mecânica e Eletrônica and ECTECH Projetos e Automação, partner companies subcontracted by CPFL Services to install the Supervision and Control System. The protection relays used in this project are Schweitzer's, also a partner of CPFL Serviços.

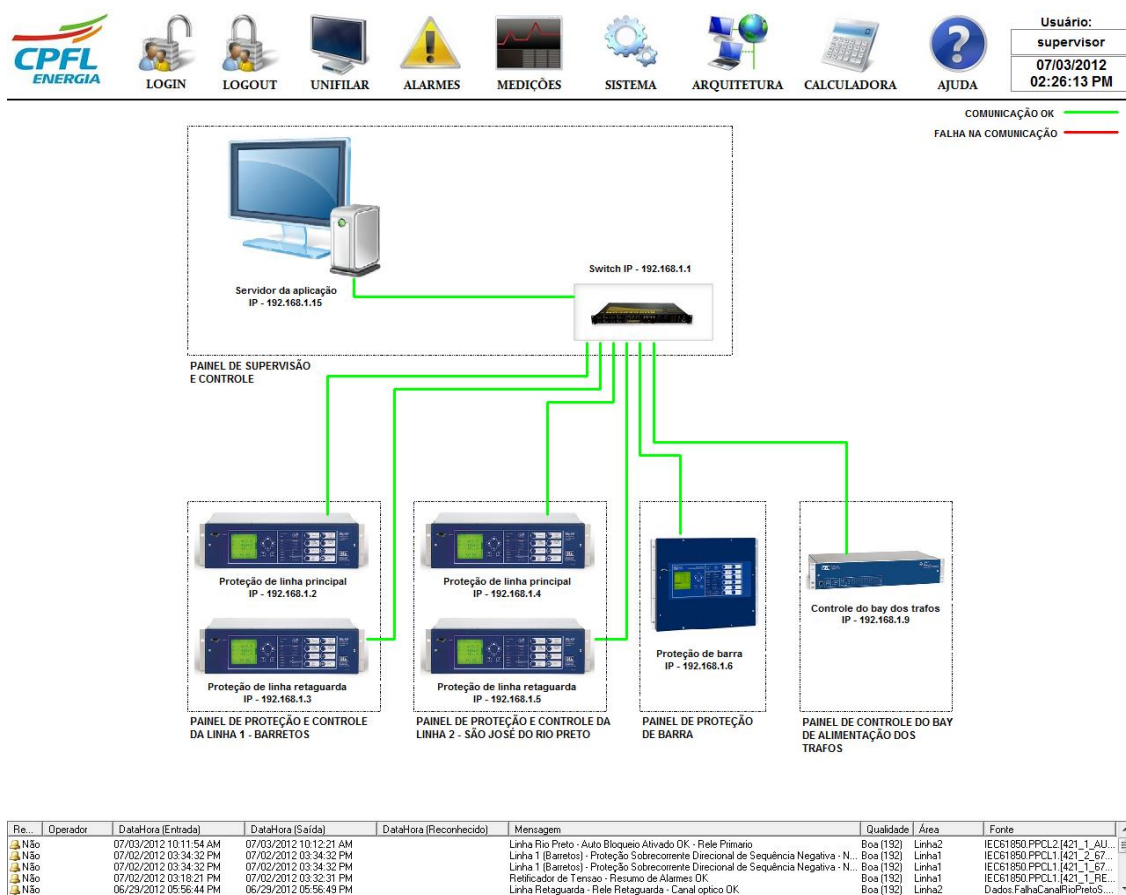


Figure 1. System Architecture

Solution

Built in May 2012, the purpose of the substation is to raise the voltage of the electricity generated by Guarani plant - Cruz Alta unit, based in Olympia, from 13.8 to 138 KV. Once the conversion is made, the energy can then be exported to the electric system and freely marketed.

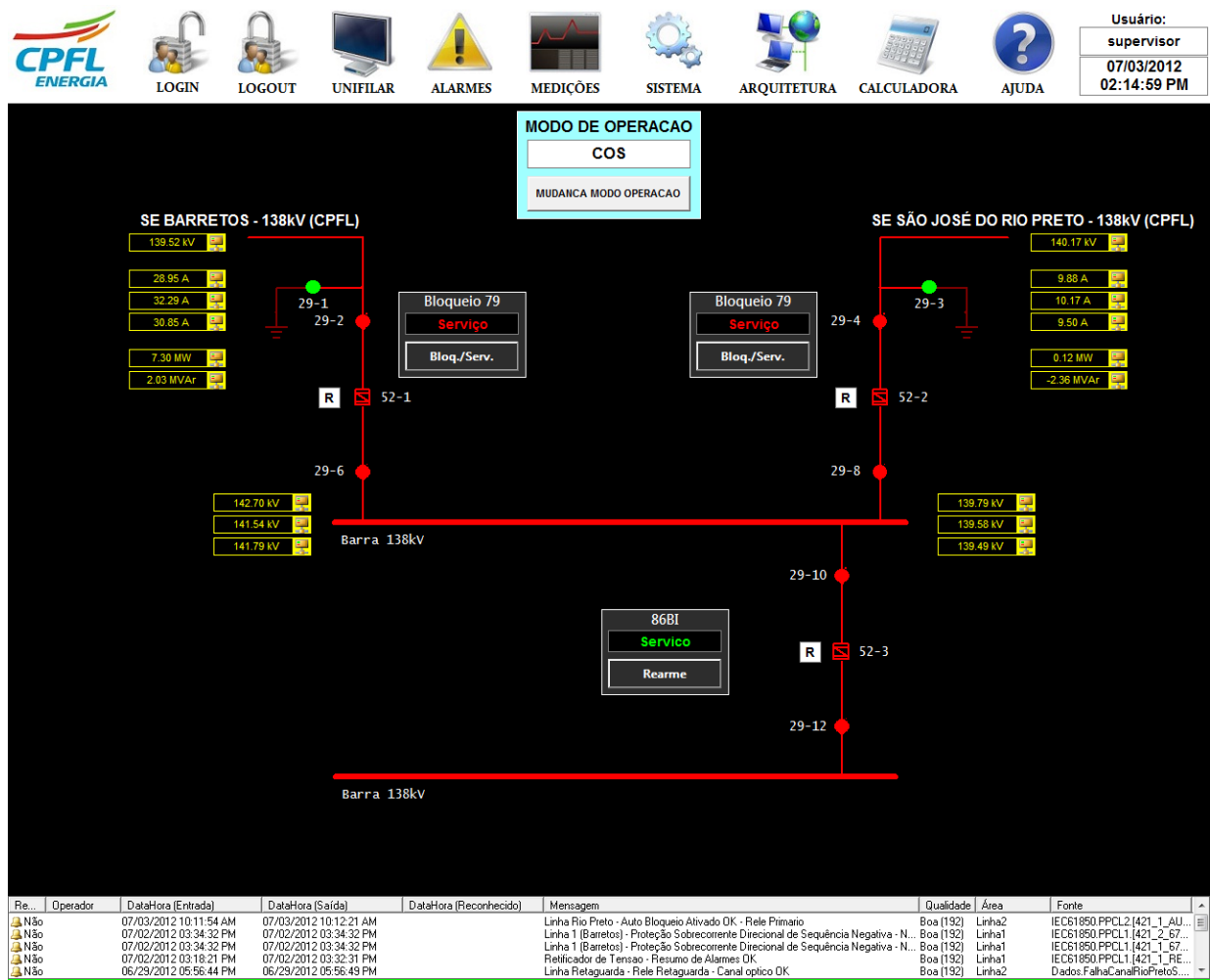


Figure 2. Transmission line which passes by Barretos, Cruz Alta, and São José do Rio Preto substations

From experience observed in other ventures, CPFL Serviços decided to install Elipse Power. Through their screens, operators can monitor the current status of breakers and disconnectors, in addition to keeping track of the different electrical parameters observed at the substation level (voltage, current, and power). Just click on the icon that represents a circuit breaker, for example, to visualize the measurements and commands that can be performed on it.

If there is a short circuit in one region of the transmission line, for example, the operator, after acknowledging and ensuring the elimination of the fault, can send a command to the protective

relay so that it reconnects the disconnected circuit breakers to isolate the affected zone, thus restoring the energy flow. Such software commands can be executed both from the substation's operations room and from CPFL Paulista's SOC, located in Campinas.

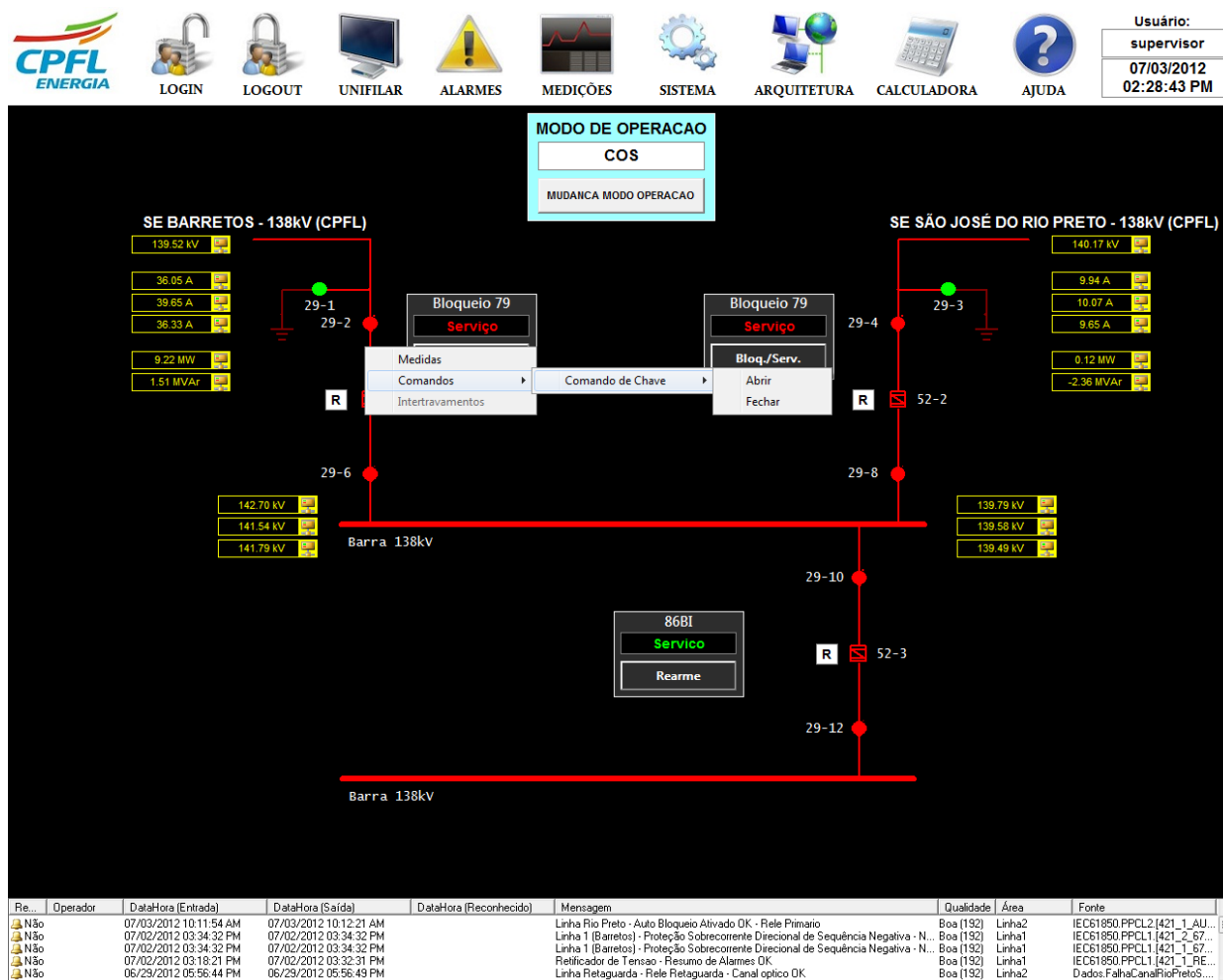


Figure 3. Command windows control of one of the breakers on the substation's transmission line

Elipse Power also has an alarm system that alerts operators about events occurring in the substation. At the bottom of all the application screens, the software informs (in real time) which relay presented the trip, the phase (A, B, or C) where it was found, date, time, and name of the user responsible for identifying the problem.

Additionally, Elipse Power lets you view a complete sequencing of events, with the possibility of deciding which time interval you want to monitor. To do this, simply place both the initial and final date/time, checking the correspondent boxes on the screen, so that the software can collect and display all alarms recorded in that period. Finally, the application also allows you to print a PDF report containing all this information.

Data_Hora	Área	Mensagem	Condição
4/7/2012 1:05:03 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 2 - Normalizado	0
4/7/2012 1:04:20 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 2 - Normalizado	0
4/7/2012 12:48:21 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 2 - Normalizado	0
4/7/2012 12:38:35 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 2 - Normalizado	0
4/7/2012 12:36:33 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 2 - Normalizado	0
4/7/2012 12:35:14 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 2 - Normalizado	0
6/8/2012 6:48:22 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3	1
6/8/2012 6:47:07 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3	1
6/8/2012 3:05:13 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3	1
6/8/2012 3:01:01 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3	1
6/8/2012 2:53:27 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3	1
6/8/2012 2:42:26 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3	1
6/8/2012 2:39:43 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3	1
6/8/2012 2:36:06 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3	1
6/8/2012 2:31:48 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3	1
6/8/2012 1:19:45 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3	1
6/8/2012 6:49:10 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 6:48:22 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 6:47:07 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 3:16:56 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 3:05:18 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 3:04:29 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 3:02:06 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 2:55:55 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 2:53:27 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 2:44:06 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 2:42:27 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 2:39:43 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 2:36:06 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 2:31:48 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 1:37:14 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/8/2012 1:21:09 PM	Barra	Barra 138kV - Proteção Diferencial Terminal 3 - Normalizado	0
6/29/2012 5:56:52 PM	Barra	Controle de Bay entre Barras - Canal optico OK	0
6/11/2012 10:50:56 AM	Barra	Controle de Bay entre Barras - Canal optico OK	0
6/8/2012 10:05:19 PM	Barra	Controle de Bay entre Barras - Canal optico OK	0

Registro: 1 de 15878

Re...	Operador	DataHora (Entrada)	DataHora (Saída)	DataHora (Reconhecido)	Mensagem	Qualidade	Área	Fonte
⚠	Não	07/03/2012 10:11:54 AM	07/03/2012 10:12:21 AM		Linha Rio Preto - Auto Bloqueio Ativado OK - Rele Primario	Boa (192)	Linha2	IEC61850.PPCL2 [421_1_AU...
⚠	Não	07/02/2012 03:34:32 PM	07/02/2012 03:34:32 PM		Linha 1 (Barreiros) - Proteção Sobrecorrente Direcional de Sequência Negativa - N...	Boa (192)	Linha1	IEC61850.PPCL1 [421_2_67...
⚠	Não	07/02/2012 03:34:32 PM	07/02/2012 03:34:32 PM		Linha 1 (Barreiros) - Proteção Sobrecorrente Direcional de Sequência Negativa - N...	Boa (192)	Linha1	IEC61850.PPCL1 [421_1_67...
⚠	Não	07/02/2012 03:18:21 PM	07/02/2012 03:32:31 PM		Relitador de Tensao - Resumo de Alarmes OK	Boa (192)	Linha1	IEC61850.PPCL1 [421_1_RE...
⚠	Não	06/29/2012 05:56:44 PM	06/29/2012 05:56:49 PM		Linha Retaguarda - Rele Retaguarda - Canal optico OK	Boa (192)	Linha2	Dados.FalhaCanalRioPretoS...

Figure 4. Screen displaying the occurrences noted on January 2 to March 7, 2012

Benefits

- Quick integration with the substation's protection and control equipment via IEC 61850 protocol.
- Easy communication with the CPFL's SOC via DNP3 protocol.
- Friendly interface that allows monitoring (in real time) the current state of the substation, its equipment, and its electrical parameters (voltage, current, and power).
- Sending remote commands to the substation relays.
- Visualization (in real time) of events which may hit the substation.
- Record of past occurrences, to decide what time interval you want to monitor.
- Ability to print reports in PDF with the occurrences reported by the software.