



ST-EL

Electrical Power and Distribution Group

ST-EL-CO
 Electrical Engineering Group
 Controls Section
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Overview

- The process
- Major user requirements
- Architecture
- Major technical choices
- Infrastructure requirements
 - location
 - technical services
 - control system services
 - communications
- Plans for installation and commissioning
- Milestones for the work
- Conclusion



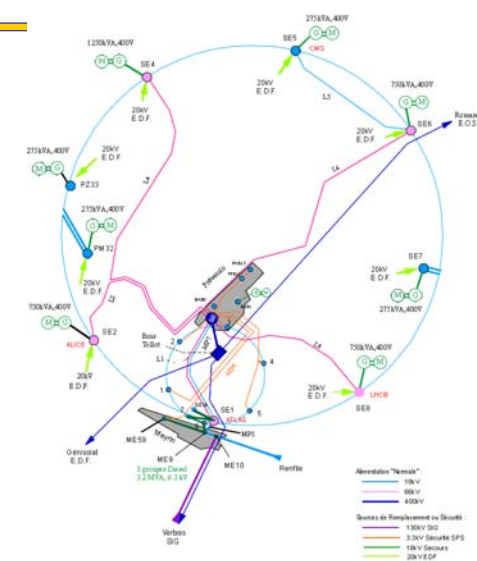
The electrical network

- Substations, distribution and power lines
 - HV substations
 - MV substations
 - LV distribution systems
 - The power lines connecting them
- The equipment
 - Breakers on all voltage levels
 - Transformers on all voltage levels
 - UPS systems
 - Battery chargers
 - Process control devices, etc., etc.
- The dimension
 - Lots of equipment...
 - Yearly consumption: 1000 GWh
- Process variables
 - 100000 input channels



The HV-MV network

Figure 8 - Réseaux Secours : situation actuelle



Some user requirements...



- Remote monitoring of equipment states
 - Status lists of electrical equipment
 - Synoptic diagrams - single line diagrams
 - Alarm lists
- Data recording for analysis
 - Events, status changes
 - measurement states
- Process control (local or centralized)
 - Automatic procedures via standard languages
 - High-level procedures without programming

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Architecture



- Centralized
 - SCADA applications
 - Configuration and logging databases
 - Web services
- Distributed
 - Data acquisition interfaces (front ends)
 - Serial lines to equipment – field-buses
- Electronic equipment interfaces
 - Digital input
 - Analogue input via transducers (limited usage)
 - Output

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Integration



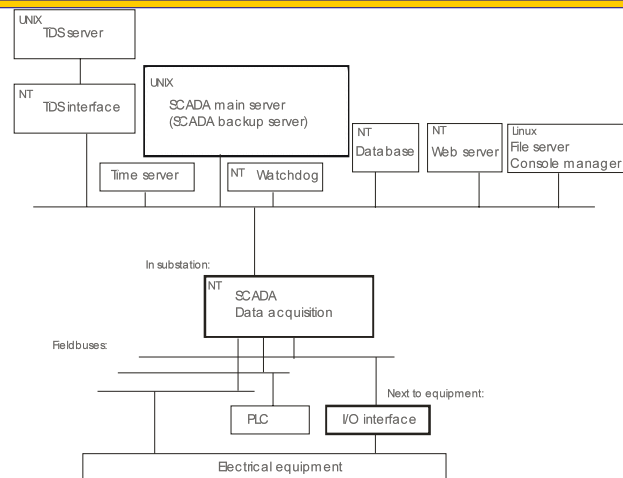
- CERN data exchange
 - Follows ST divisional principles
 - Centralized interface via TDS
 - Data types: States, measurements, CAS alarms, output
- Communication and networks
 - Technical (services) network (128.142...) - essential !
 - Dedicated optical lines to critical equipment
- Terminals/User interfaces
 - X terminals (substations, TCR, offices, BAs)
 - New SPS PC terminals
 - Web interface

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Architecture and integration

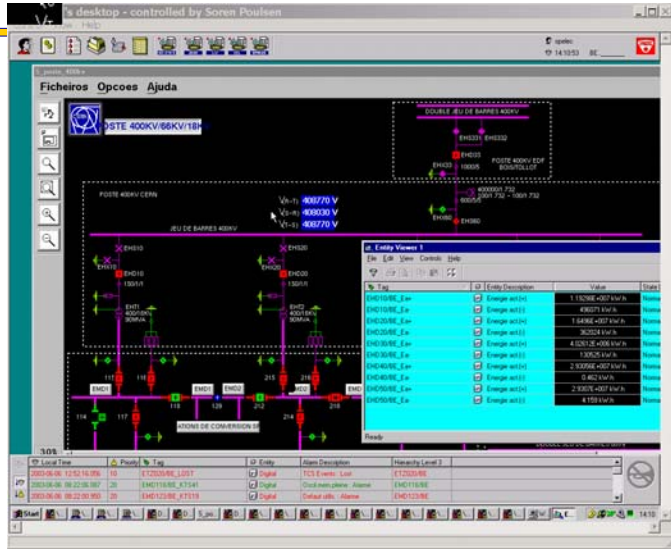


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Substation data acquisition



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Communication - exchange



- TDS integration
 - Standard DDAL API
- Database servers
 - Oracle ODBC drivers
- Distributed data acquisition systems
 - IEC standard protocol over TCP/IP
- Field buses
 - Standard field buses: Modbus/JBUS (RS-485 support)
 - Dedicated Field bus for I/O interfaces: LonWorks
 - Some electrical equipment with private “field buses” !
 - Software gateways possible in special cases

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Infrastructure requirements



- Reliable power supply
 - 48V for substation equipment (data acquisition)
 - UPS for communication equipment
 - UPS for servers and computing infrastructure
- Communications network
 - High availability
 - Secure networks
 - No specific bandwidth requirement

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Planning - milestones



- SPS
 - Partial installation (no complete SPS renovation yet)
 - BA4 completed, BA7 planned for 2003
 - SPS electrical renovation not yet funded
- LHC
 - Surface buildings completed by September 2003
 - Underground not yet started – limited installation
 - Some LEP equipment still operational in alcoves!
- Meyrin
 - Planned for shutdown 2003-2004

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Outstanding issues



- Experimental control and supervision
 - Expensive revamping of LEP distribution
 - Expensive controls cabling for supervision
 - Project under way with first experiment
- LHC supervision
 - Data exchange infrastructure in place but...
 - exact configuration of data required not fixed
 - Need to validate implementation (speed, etc.)
- LHC data logging
 - Exact data definition not yet finalized

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Conclusion



- Progress
 - Electrical equipment defined, in installation
 - Controls hardware and infrastructure in place
 - Controls software still open for development
 - Operational experience already accumulated
 - Potential outstanding issues to fix before 2005
- More information?
 - <http://st-div.web.cern.ch/st-div/groups/el/el.htm>

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Last slide



Thank you !

- More information?
- Questions?

- Or go directly to
 - <http://st-div.web.cern.ch/st-div/groups/el/el.htm>

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