



Power Stability Expert

# Система управления энергией (EMS)

Более экономическое эффективное решение



В качестве поставщика решений для EMS, обладающего обширным опытом работы в энергосистеме, NR уже реализовала большое количество проектов для коммунальных предприятий и отраслей по всему миру, чтобы предоставить своим клиентам самые экономичные продукты и решения.

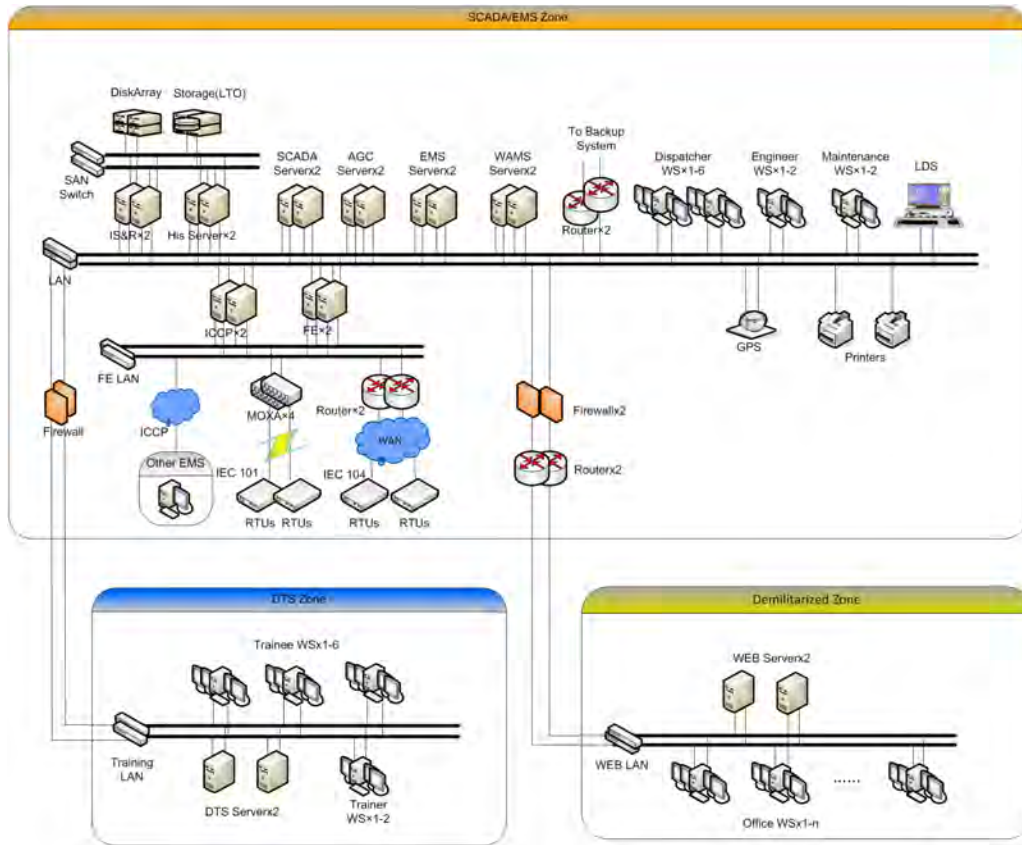
NR PCS-9000 EMS is an advanced control center solution to monitor, control, manage and optimize the generation and transmission of power grid reliability and efficiency. With adopting a state-of-the-art IT, object-oriented database and visualized cross-platform technology it provides abundant practical applications to manage the expanding power system and reduce the operating and maintenance costs. With hundreds of licenses deployed in China and all over the world from Substation, Wind farm to the largest National Dispatching centers, PCS-9000 EMS is a versatile system to facilitate an efficient, secure and reliable grid operation, managing not only for today's power network but also for tomorrow's Smart Grid.

From ultra-high transmission to industrial electrification control center projects, NR is a partner you can always rely on.

## Function

PCS-9000 EMS complies with the latest international standards such as IEC61970, providing a unified application platform for large scale energy management of power utilities. The applications of PCS-9000 system includes SCADA, Automatic Generation Control (AGC), Power Advanced Software (PAS), Dispatching Training Simulator (DTS), Wide Area Measurement System(WAMS), Dispatcher Management Information System (DMIS) and WEB. It can also be easily integrated with other systems which comply with IEC61970 standard. This is in favor of protecting the existing investments and reducing internal information and function redundancy.

The design philosophy behind PCS-9000 EMS is to meet the high availability, expandability and performance required for real-time power system operations. PCS-9000 EMS adopts modularized designing idea to establish standard, practical and simple, easy maintenance system. PCS-9000 EMS keeps up with the latest developments in software and information technology to provide customers with full life cycle upgrade and service, so customers will always benefit from the development of new technologies and lower their total cost of ownership of SCADA/EMS system.



PCS-9000 system structure

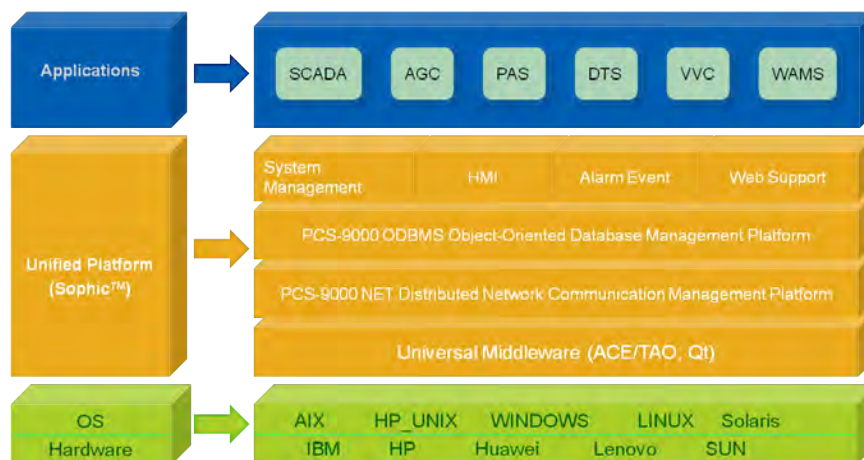
PCS-9000 EMS comprises two layers:

**Unified Application Supporting Platform (ASP) Layer**

PCS-9000 unified Application Supporting Platform (ASP) provides powerful and universal services for applications such as distributed real-time database management, intuitive man-machine interactive graphic interface, network information transmission, inter-process communication, system management and alarm service etc. It is independent of computer manufacturers and can execute across hybrid hardware platforms architecture.

**Electric power system applications Layer**

PCS-9000 EMS provides full series power system applications to enhance power system management . Each application based on PCS-9000 ASP is modular designed for easy installation, operation, maintenance and expansion. Its modular functions can be easily customized to meet the customer demands. Moreover PCS-9000 EMS is expandable to accommodate the anticipated system growth.



PCS-9000 software structure

## Features

### Unified Application Platform

PCS-9000 EMS provides an autonomously developed software integration platform: complying with the latest international standards, adopting the state-of-the-art IT technology, and object-oriented real-time database modeling. PCS-9000 is equipped with a unified data display, unified system management and unified WEB application.

### Customized System Configuration

All functions of PCS-9000 adopt modular design. Users can freely select the required application modules to build their own application system. It is ensured that when a new application module is added, other operating functions will not be affected. It provides unified application configuration tools to configure the corresponding applications online.

### More Effective and Visualized User Interface

The integrated Diagram-Model-Database Modeling Technology based on IEC61970 CIM facilitates, users to draw single line diagram and build network model simultaneously. The full-graphics user interface is network based and can be operated remotely or locally.

### Reduced Dependence on Proprietary Platforms

The use of cross-platform visualization technology and operating system independent middleware provides the system with better portability, more easy expansibility and lower cost maintenance. PCS-9000 EMS can be deployed on various hardware platforms and operating systems (such as: Windows, Unix and Linux) conveniently.

### Flexible Distributed Data Acquisition

The independent acquisition application can be distributed to suit the communications infrastructure. It supports all of the available protocols include international standard protocols, multiple industry standard protocols, proprietary and legacy communication protocols. Additional protocols can be easily implemented and loaded online without downtime.

### Easy and Safe Maintenance

PCS-9000 EMS provides safe maintenance mechanism: offline maintenance and disturbance-free online loading. Any modification of model, parameter, data or diagram will trigger strict verification and testing before loading and operation of the modification. This reduces the pressure on maintenance personnel, and ensures system operated safely and continuously.

### Expandability and Progressive Upgrading

PCS-9000 EMS is easily expandable due to its distributed modularization structure which utilizes ESB (Enterprise Service Bus) based on SOA. It facilitates integration with new applications and upgrades EMS with less complexity and at lower cost.

## Functions

### SCADA

- Data acquisition and Processing
- Control and Regulation
- Sequence of Event(SOE)
- Reserved Capacity Supervision
- Data Calculation and Statistics Assessment
- Trend Curves
- Post Disturbance Review(PDR)
- Event and Record
- Historical Functions
- Blocking and Unblocking
- Labeling
- Topological Coloring
- Shift Takeover Management
- Clock Synchronization
- Database Modeling
- Manual Data Input
- Network-Oriented Function
  - Automatic bypass substitution
  - Automatic opposite-end data substitution
  - Automatic busbar balance factor calculation
  - Dynamic topological coloring
  - De-energized equipment/area recognizing
  - Earthing equipment/area recognizing
  - Equipment over-limit and alarm
  - Area statistics
  - Electrical energy statistics

### Automatic Generation Control (AGC)

- Automatic Generation Control
- Load Frequency Control
- Economic Dispatch
- LFC Performance Monitor
- Reserve Monitor
- Generation Scheduling
  - Unit Basic Power Plan
  - Output Reduction Plan
  - Real-time Generation Plan
- Transaction Scheduling
- Unit Test and Sampling
- Super Short-term Load Forecast
- Unit Commitment
- Hydro Scheduling & Hydro-Thermal Coordination

### Power Application Software (PAS)

- Network Modeling
- Network Topology
- State Estimation
- Dispatcher Load Flow
- Short Term Load Forecast
- Contingency Analysis
- Short circuit Current Calculation
- Optimal Power Flow
- Automatic Volt/VAR Control (AVVC)
- Dynamic Stability Assessment

### Wide Area Measurement System (WAMS)

- Basic Function
  - Data acquisition
  - Data processing
  - Alarm processing
  - Data calculation
  - Statistic calculation
  - Control and regulation
  - Network topology analysis
  - Network topology dynamic coloring
- Analysis Function
  - Grid operation dynamic supervision
  - Auxiliary service analysis
  - Power system model and parameter check
  - Post-disturbance review and simulation curve check

### Dispatcher Training Simulator(DTS)

- Trainer Subsystem
- Power System Simulation Subsystem
- Control Center Simulation Subsystem

### Dispatcher Management Information System (DMIS)

- Common Subsystem
- Dispatching Operation Subsystem
- Operation Mode Subsystem
- Dispatching Planning Subsystem
- Relay Protection Subsystem
- Automation Subsystem
- Communication Subsystem
- Comprehensive Subsystem

### WEB

- Adopting SVG and Ajax technology
- Can run on all kinds of OS and hardware platform
- Contents browsed on WEB include: graphs, curves, events, tables and reports.
- Supporting multi-user simultaneous offline network analysis, e.g.load flow calculation and contingency analysis, etc.

## Reference



### EMS for South Grid of China

China Southern Power Grid Company Limited (CSG) is the second largest utility company in China which invests, constructs and operates power networks in Guangdong, Guangxi, Yunnan, Guizhou and Hainan provinces. The service area covers 1 million square kilometers, with a population of 230 million. In 2013, the electricity sale was 743.3TWh. The total installed generation capacity reached 230GW. The whole grid of CSG contains 2 sets of 800kV converter substations, 165 sets of 500kV Substations, 814 sets of 220kV substations, 3259 sets of 110kV substations and 2707 sets of 35kV substations.

In April 2014, CSG chose NR Electric as the supplier to help them for enhancing network efficiency, increase power reliability and provide strategy support to dispatchers. PCS-9000 EMS follows SOA architecture to build integration platform and enterprise service bus (OSB). It shares information with Hydropower scheduling system, lightning monitoring system, automatic fire detection system and weather forecast system, eventually building a grid panoramic model of business applications for the dispatch center. PCS-9000 offers best-in-class applications and high quality service to CSG and helps CSG to increase profitability in both energy supply and business processes.

