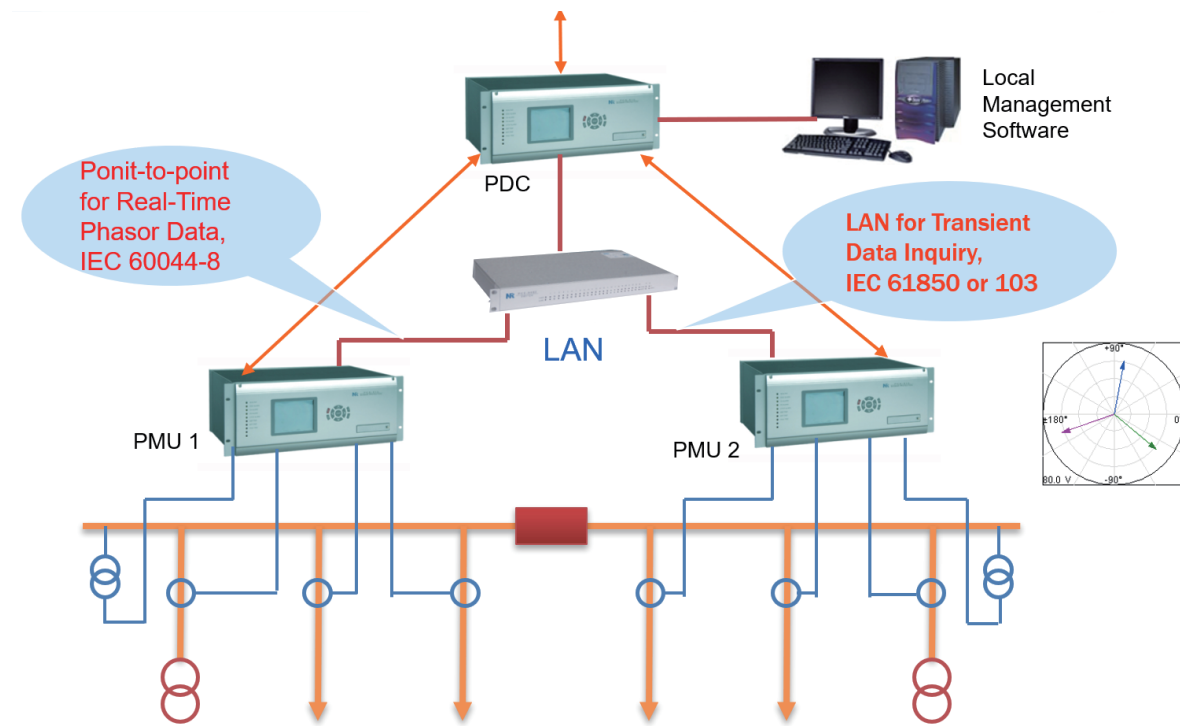




Case Study – Nigeria National EMS

2 national and 3 regional control centers, seamless switching between national centers
60+ 330kV and 170+ 132kV substations and plants have been accessed with total capacity of 12910.4 MW



PCS-9000 Energy Management System

Pay More Attention to Your Concern



www.nrec.com/en

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NR ELECTRIC CO., LTD.

PCS-9000 SCADA/EMS

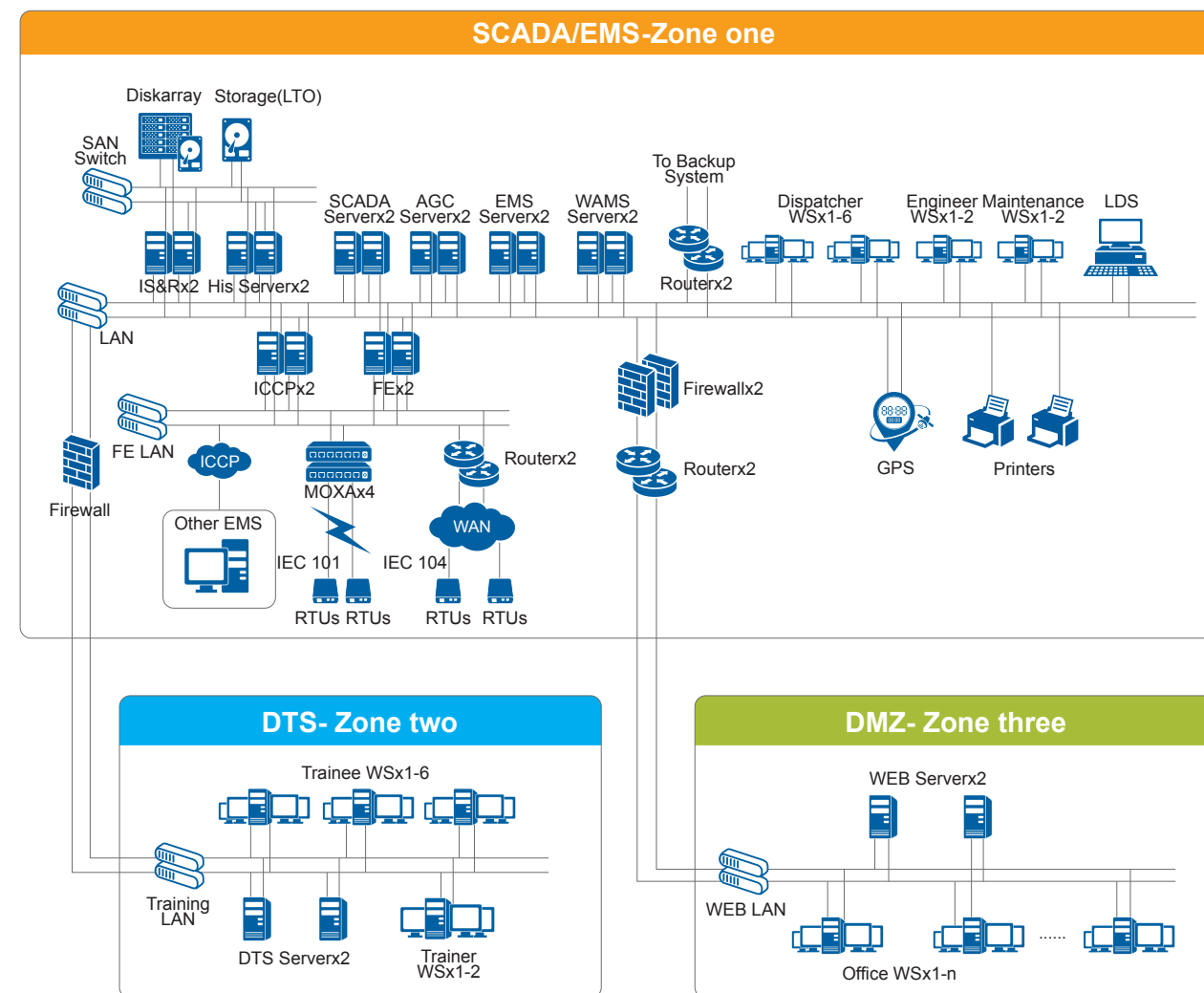
PCS-9000 SCADA/EMS is an advanced control center solution to monitor, control, manage and optimize the generation & transmission of power grid reliability and efficiency. It adopts a state-of-the-art network management, object-oriented database and visualized cross-platform technology. Furthermore, it provides abundant practical applications to manage the expanding energy system and reduce the operating & maintenance costs, while meeting the present and future's ever-changing business requirements. With hundreds of licenses deployed in China and all over the world starting from Substation, Wind farm to the largest National Dispatching center, the PCS-9000 SCADA/EMS is a versatile system to facilitate an efficient, secure and reliable grid operation, not only for managing today's power network but also for tomorrow's Smart Grid.

The PCS-9000 SCADA/EMS complies with the latest international standards such as IEC 61970, providing a unified application platform for large scale energy management of power utilities.

- Ensure security, stability and reliability of the power grid
- Easy to extend the system

Product Advantages

- Reduce dependence on proprietary platforms
- Enable to predict and simulate the power system



PCS-9000 SCADA/EMS typical configuration

SCADA

- Data acquisition and Processing
- Control and Regulation
- Event, Record and SOE
- Database Modeling with Integrated Graphic/Model/Database Tech
- ...

PAS

- Network Modeling
- Network Topology
- State Estimation
- Dispatcher Power Flow
- Short-term Load Forecast
- Contingency Analysis
- Short circuit Calculation
- Optimal Power Flow
- AVC

PCS-9000 SCADA/EMS

AGC

- Load Frequency Control
- LFC Performance Monitor
- Economic Dispatch
- Reserve Monitor
- Generation Scheduling
- Transaction Scheduling
- Ultra Short-term Load Forecast
- Unit Commitment
- Hydro Scheduling & Hydro-Thermal Coordination
- Unit Response Test

WAMS

- Wide Area Measurement System

DTS

- Dispatcher training and examination
- Anti-accident Exercise
- Operation mode analysis
- Configuration and checking of settings
- Province/Regional/Substation Combined training

Wide Area Measurement System (WAMS)

The Wide Area Measurement System (WAMS) is used to monitor grid operation status, analyze system characteristics, and accurately capture power system dynamic characteristics during fault disturbance and power swing. It is an effective tool to monitor power system stability.

The real-time monitoring of power system dynamic characteristics greatly facilitates power system stability analysis, early warning, secure dispatching, fault analysis, parameter identification and online stability decision making.

WAMS can realize synchronous measurement & rapid transmission, and thus it is suitable for large scale rapid control. It is one of the most potential measures to control regional power exchange, restrain fault area extension and enhance main network operation safety.

Basic Function

- Multi-source data acquisition & processing
- System Monitoring
- Calculation of phase Angle difference
- Trigger Wave Record
- Oscillatory Stability Monitoring

Analysis Function

- Over-limit surveillance and warning
- Dynamic steady-state comparison
- Line unbalance monitoring
- Low/ultra-low Frequency Oscillation Monitoring
- Grid Disturbance Analysis
- Unit Frequency Modulation Performance Evaluation