



DF3000 Substation Automation System



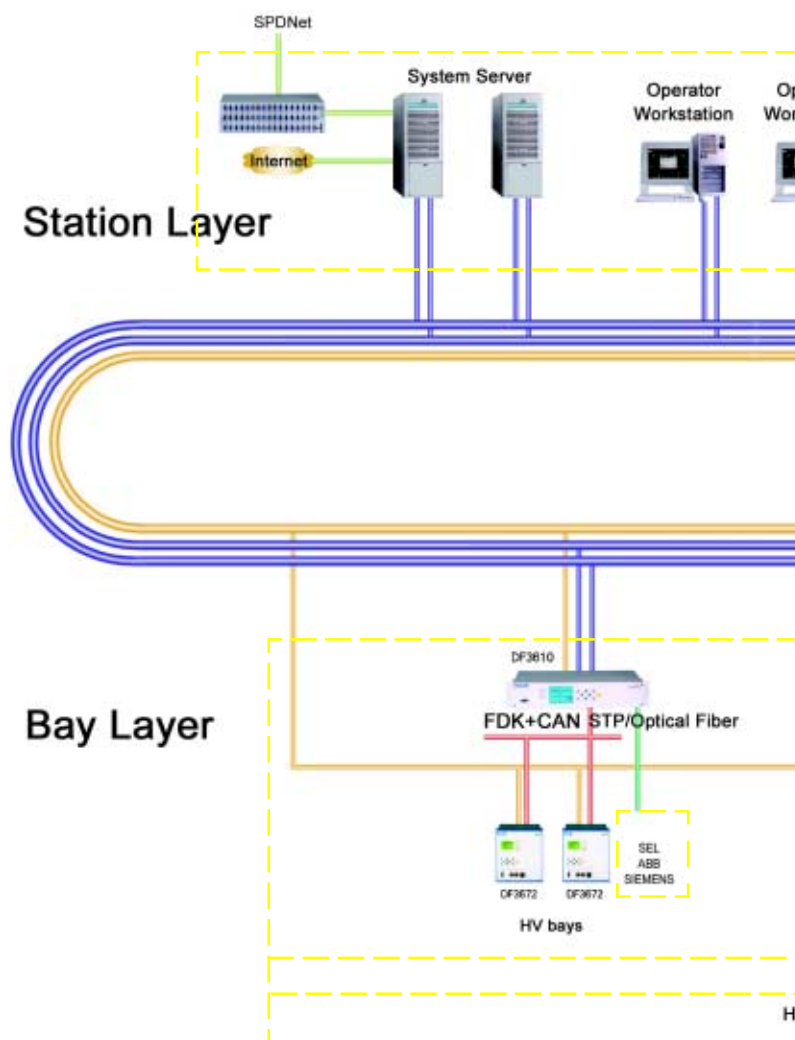


DF3600 Object-Oriented HV Substation Monitoring and Control System

System Overview

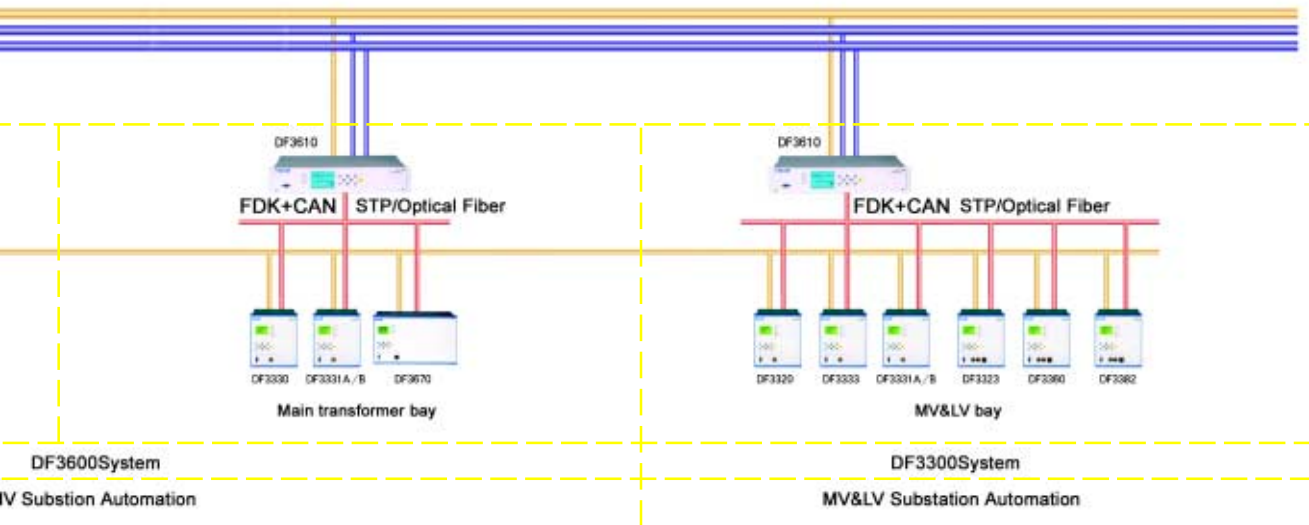
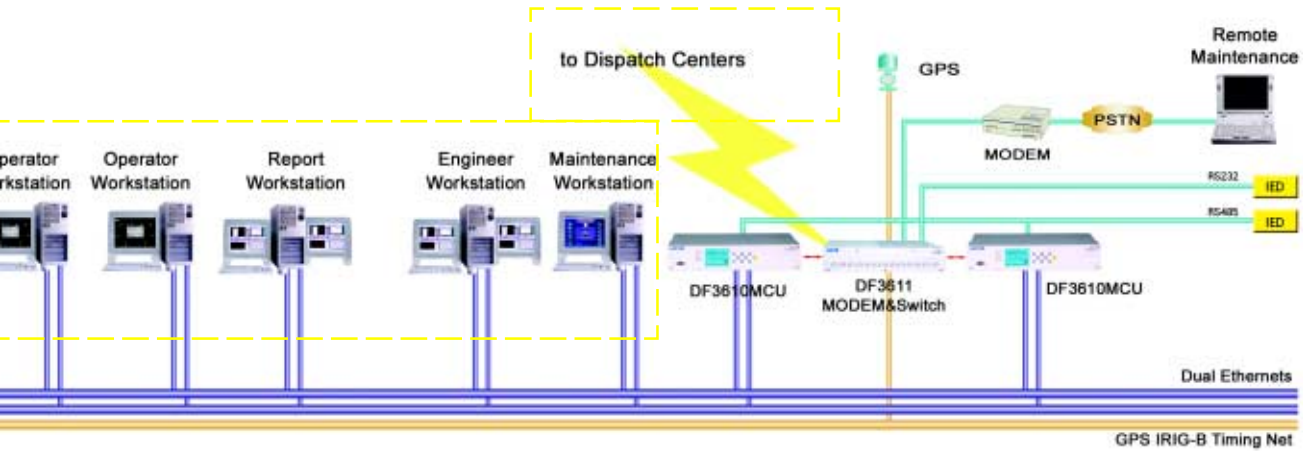
The DF3600 Object-Oriented HV Substation Monitoring and Control System is an advanced object-oriented, hierarchical and distributed substation monitoring and control system for various voltage levels from 35kV to 500kV. The system adopts the hierarchical and distributed architecture and can be divided into two levels: station level and bay level. The local monitoring and control system, network equipments, etc. are included in the station level network equipments, generally consisting of communication processing device DF3610 and communication switch device DF3611. The series of monitoring and control units DF3670~DF3679 are in the bay level. Bay level devices employ the bay oriented configuration as well as the configuration according to the functions. Bay units are individual, and do not interfere with each other to improve the flexibility and reliability of the whole system.

This network system employs a two-level hierarchical and distributed network: station level communication network and bay level communication network. This network structure meets the requirements of IEC61850. The station-level communication network employs dual-Ethernet whose communication rate may be either 10Mbps or 100Mbps. The bay level communication network can be connected via two kinds of field bus, FDKBUS and CANBUS, or can be directly connected via Ethernet to ensure the real-time ability and reliability.





Substation Monitoring & Control System (SCS)





Features

- Bay oriented design;
- Advanced system structure;
- Flexible network configurations and communication modes;
- Unique FDKBUS fiber optics dual-loop network with self-recovery ability;
- Bay-level monitoring and control devices can be connected directly to Ethernet;
- Particularly long cipher-lock and negative voltage technology insure that remote-control will not maloperates under seriously worst condition;
- Perfect GPS time synchronization function;
- To support dual-Ethernet to connect with the state power data net by TCP/IP protocol;
- To support WEB browse search and E-mail running log;
- Particular field bus, dual-net distributary;
- Higher harmonic analysis, automatic quasi-synchronization, fault record and other functions can be implemented due to the application of DSP;
- Perfect redundant dual-processor hot standby improves the reliability of the system;
- Abundant communication protocol library makes it easy to connect with various intelligent electronic devices (IEDs);
- Comprehensive remote maintenance function;
- Capability of anti-electromagnetic interference, passing the strictest demands, IV level of the international standard IEC61000-4 concerning electromagnetic compatibility, parts of indexes exceeding IV level standard.



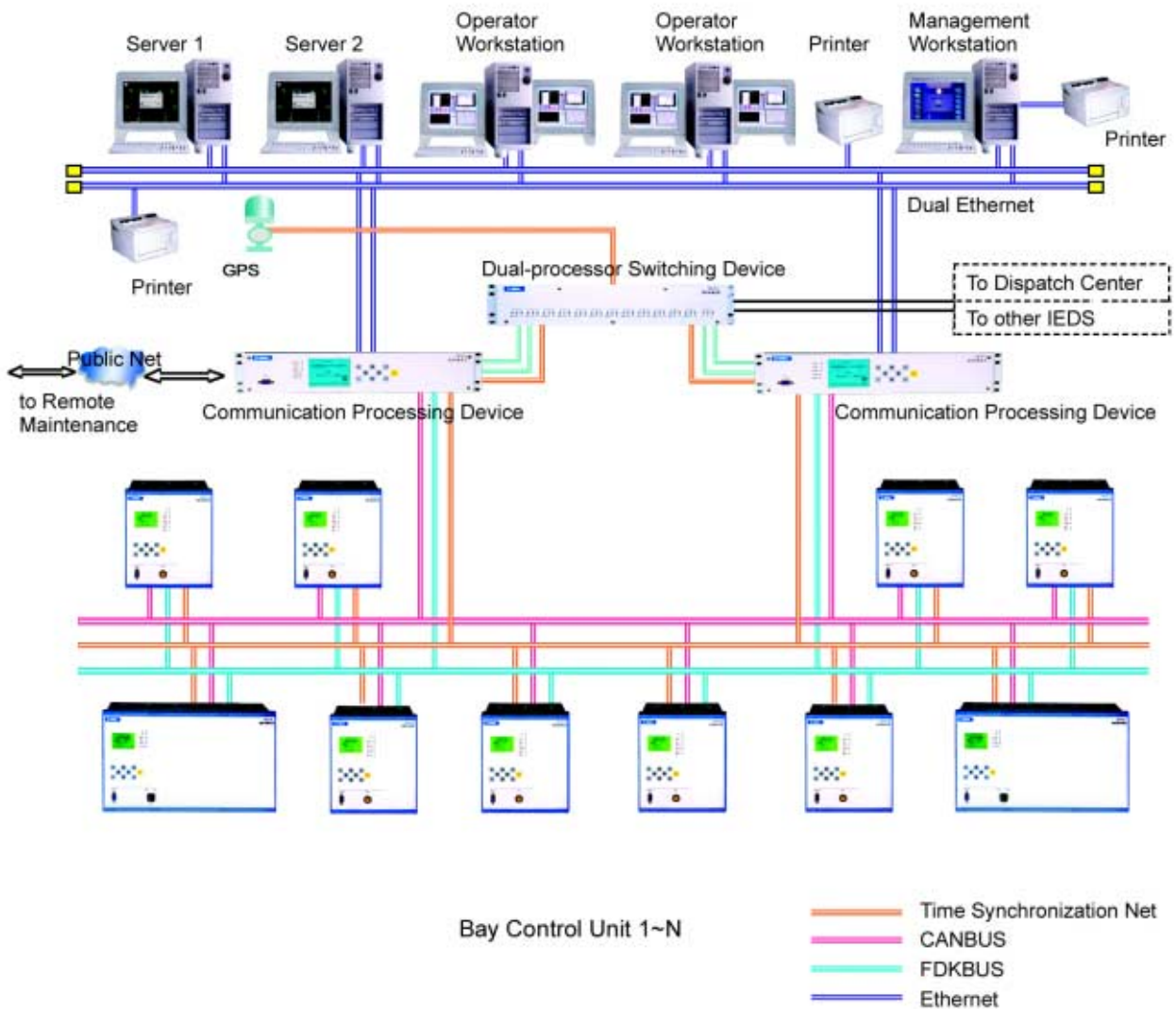


Configuration and Communication Mode

Unique Field-bus Dual-network Distributary

The DF3600 system employs two different types of the field-bus network, FDKBUS and CANBUS, and fully takes their advantages of the high-speed synchronous communication of FDKBUS and quick response to abnormal data of CANBUS. In the system design, the unique communication mechanism of dual-network distributary and fault switch are adopted. In the case of normal operation of these two networks, they operate in parallel according to the system tasks to implement the dynamical information flow control. Thus, the system bandwidth is utilized to the maximal extent. When one of the two networks is out of work, the tasks of the faulted network will be shifted to the normal network to ensure the integrity and to improve the system reliability.

The architecture of DF3600 system based on FDKBUS and CANBUS twisted-pair is shown as follows:



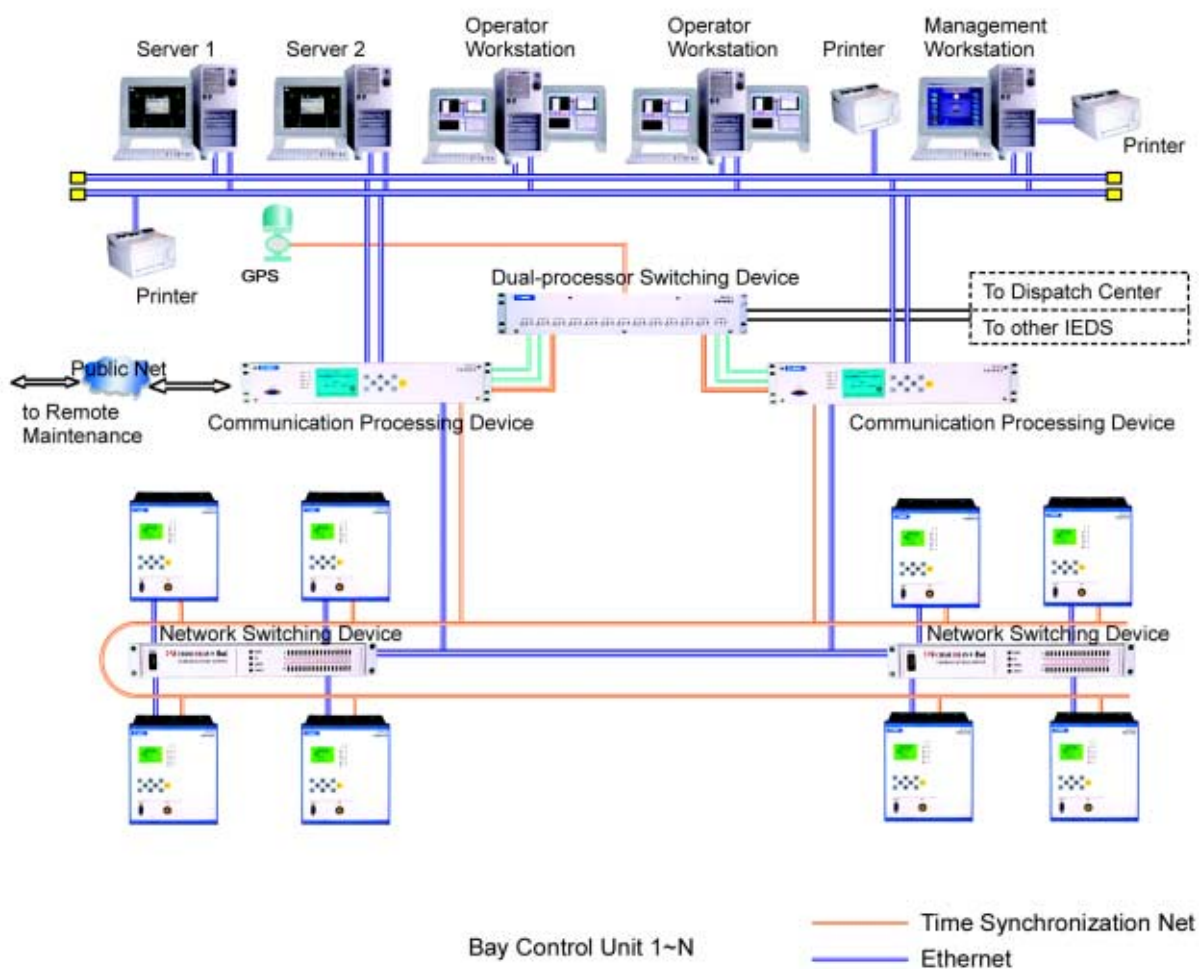


Substation Monitoring & Control System (SCS)

Support Bay-level Measure and Control Devices directly connected with Ethernet

All of the measure and control devices in DF3600 system may be configured with the Ethernet communication function. The open TCP/IP protocol is adopted and the communication rate is 10Mbps which meets the requirements of data communication rate and reliability. At the same time, the system has the capability of expansibility. The communication media may be twisted-pair or fiber optics. The communication mode of Ethernet is consistent with the requirements of new international standard IEC61850 for substation automation.

The architecture of DF3600 system based on Ethernet is shown as follows:



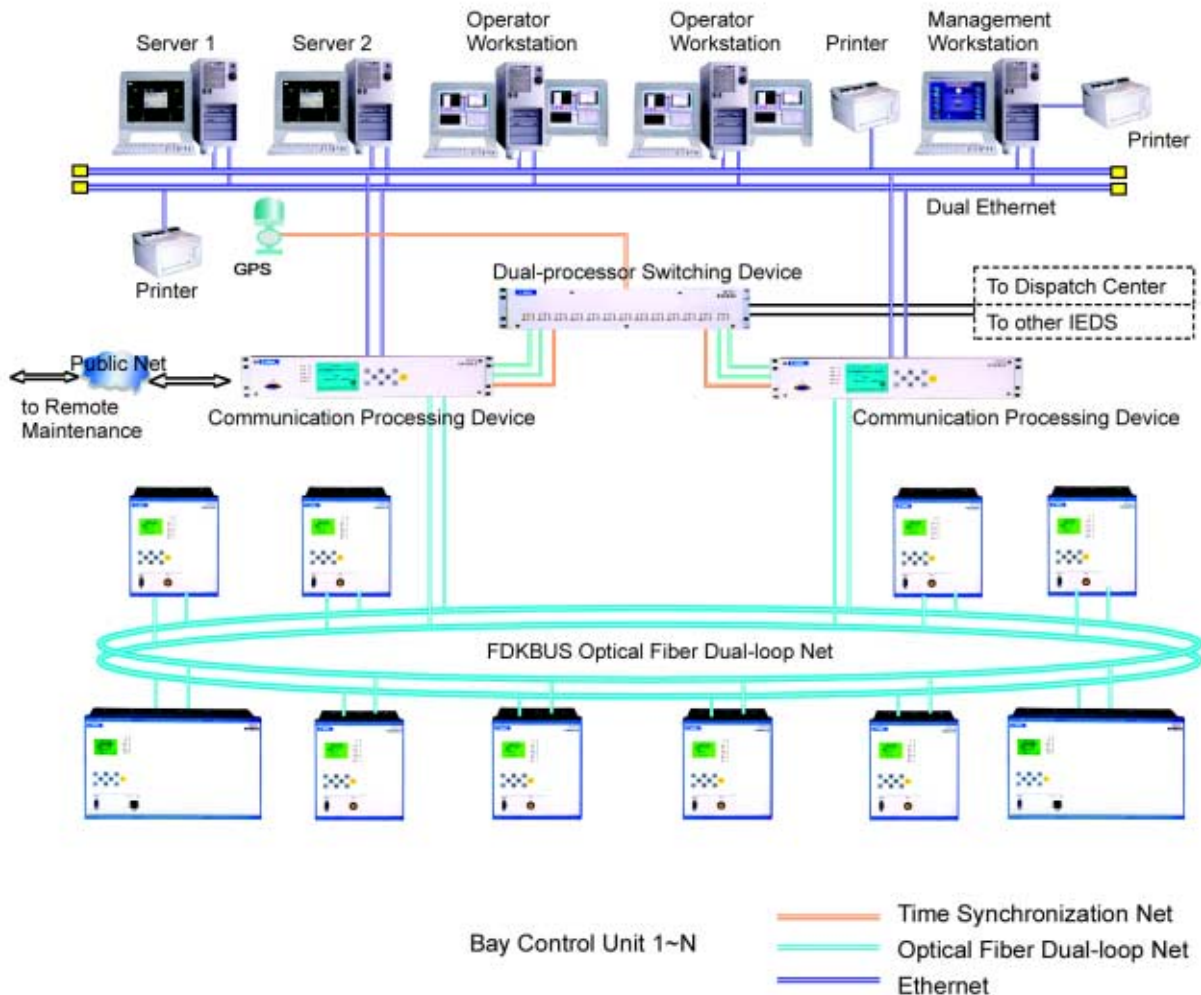


Substation Monitoring & Control System (SCS)

Fiber Optics Self-recover Dual-loop Network

FDK-bus supports such configuration mode as fiber optics self-recover dual-loop network with Time Division Multiplexing technology and greatly improves the communication reliability.

The architecture of DF3600 system based on fiber optics dual-loop network is shown as follows:



As well-known, the electromagnetism in the substation is very strong. To improve the communication reliability, based on the successful application of FDKBUS, DF3600 system develops the fiber optics dual-loop network technology with the ability to self-recover. The application of dual-loop network ensures the communication real time. And the configuration of dual-loop network make the system automatically self-recover under the condition of fault and the communication reliability is guaranteed. The network has the ability of anti-electromagnetic interference due to the use of fiber optics. Fiber optics dual-loop time division multiplexing time synchronization is adopted, that is, while normal real-time data transferring, IRIG-B time code is also used. Thus, some cables for time synchronization are saved, and the system reliability and time synchronization precision are greatly improved.



DF3600 Bay Level Series Product List

Type	Brief Function Description
DF3610MCU	Main communication processing unit, with LCD and keyboard, 10 serial RS232/485/422 and 2/4 Ethernet ports/ FDK-bus+CAN interfaces/FDK-bus dual optical fiber net interface, 19 inch, 2 U
DF3611 MODEM	MODEM channels, Serial port switch channels, GPS time synchronous board
DF3670IED	72 DI, 24 DO, 6DCAI, ACAI sampling for 6 circuits of 3 phases 4 lines mode or for 4 circuits of 3 phases 3 lines. FDK-bus + CAN / Ethernet ports / Dual FDK-bus optical fiber net interface, 3 serial ports, " 6U, LCD Keyboard
DF3671IED	48 DI, 12 DO, ACAI sampling for 1 circuits of 3 phases 4 lines mode . 19"/2 6U, LCD Keyboard
DF3672IED	32 bit DSP, 48 DI, 12 DO (1 synchronism close), ACAI sampling for 1 circuits of 3 phases 4 lines mode. 19"/2 6U, LCD Keyboard
DF3673IED	24 DI, 12 DO, 2DCAI, ACAI sampling for 1 circuits of 3 phases 4 lines mode. 19"/2 6U, LCD Keyboard
DF3674IED	16 DI, 2 DO, ACAI sampling for 1 circuits of 3 phases 4 lines mode. 19"/3 6U, LCD Keyboard
DF3675DI	96 DI. 19"/2 6U, LCD Keyboards
DF3676DO	36 DO. 19"/2 6U, LCD Keyboards
DF3677DCAI	64 single input DCAI or 32 dual input DCAI. 19"/2 6U, LCD Keyboards
DF3678	24 DI, 24 DO, 24/12ACAI. 19"/2 6U, LCD Keyboards.
F3679 ACAI	ACAI sampling for 8 circuits of 3 phases 4 lines or 13 circuits of 3 phased 4 lines mode. 19"/2 6U, LCD Keyboards.
DF3683VQC	Application for 1 three-winding transformer and 4 capacitor banks VQC adjustment





DF3600 Station Level Monitoring and control System

System Introduction

The whole system can be configured Client/Server (C/S) or Browser/Server (B/S). And each subsystem may be integrated flexibly according to the user's requirements.

The system adopts the fully distributed structure and distributes each function module to each net node in the system to ensure the system expansibility. The primary network adopts the dual-net mechanism distributary/redundancy. The nodes connected with the net include the front-end processor workstation, real-time library and historic library server, SCADA workstation, WEB browse server, maintenance engineer workstation, microprocessor anti-maloperation workstation, communication workstation, report forms workstation, remote image monitoring and security alarming system workstation, etc.

The communication mode for data acquisition is dual-channel redundancy mode and supports multiple data acquisition interconnection schemes such as network interchanger, router, terminal server, etc. The communication mode supports multiple communication accessing modes including Ethernet, special line, carrier, microwave, etc, and the communication media may be fiber optics, twisted-pair, coaxial-cable, etc, to ensure the reliability of data acquisition communication.

FEATURES

- Distributed Redundant Multi-Server Net Architecture
- Hierarchical Full-Open System Design
- Advanced Graphical Display and Graph-Model Uniformity Technology
- Function-defined Tools
- Abundant Network Interconnection





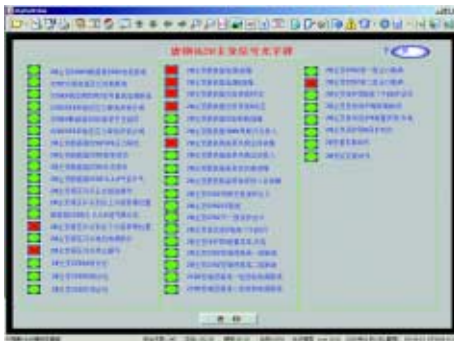
Station Level System functions includes:

■ Data Acquisition, Processing and Communication Function

The adopted standard commercial communication component, independent of HW and SW platform, improves the communication processing ability. Each channel possesses independent communication I/O ability to eliminate the limits on extension of data acquisition channels and the speed improvement.

■ Supervision Function

Directly display the operation condition of each module and network communication status
Human-Machine Interface (HMI)
Tele-control and operation block
Events and processing
Sequence of Event (SOE)
Post disturbance review (PDR)
Time synchronization

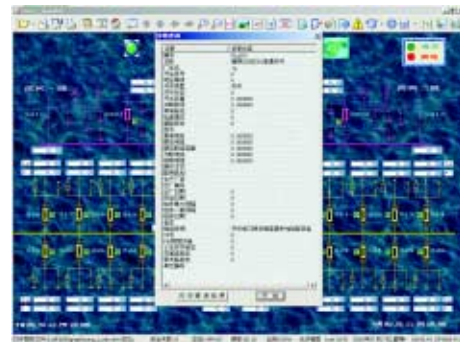


■ User-defined Operation Function

Provide the advanced bay oriented calculation processing platform. Easy to add new functions. With user-control language, users can self-define the operation procedure and process all the real points and virtual points occurred in the system.

■ Protection Management Function

The system may choose the individual protection workstation to process and supervise the protection information, and to receive the information including various protection trip signals, auto reclosure signals, protection operation supervision signals, protection settings and group number, event reports, fault record, etc. Protection settings, measured values, etc, can be checked and modified in the protection workstation.



■ Automatic Record and Management for Operation Log

Operators can perform the record and management functions when keying little words or no words.

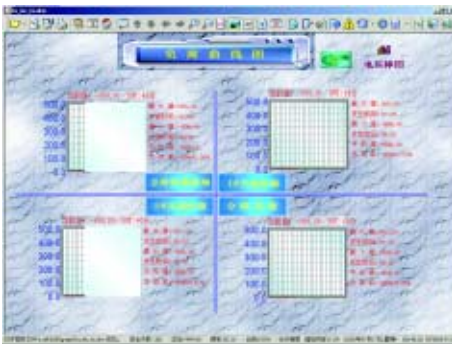
■ Web Real-time Browse Function

The system is configured the Web server and provides the Web homepage real-time display release. The general Internet browse mode is employed to view the real-time display. And the modification and update of the real-time display are all automatically refreshed by the Web server and maintenance-free is indeed implemented.



■ Report Form Print Function

Various flexible report forms are created and graphs can be inserted in them, such as curves, bars, circular charts and others. Daily and monthly report forms, operation records, manage information graphs, various statistics forms, power grid events and system events can be printed.



■ Security Function

All operators are offered some rights which specifies the limits to access to the system. The operator purview table and real-time event table used in the system are defined as the uniform GUI style of Microsoft SQL or SYBASE DB.

