

The Customer Company: Oktyabrskaya railroad (Moscow-Sankt-Petersburg-Murmansk)

Starting point:

The railroads in Russia are among the largest power consumers. Millions of kilowatt-hours are spent for hauling operations and functioning of enterprises included in the system of the Ministry of Railways of Russia. Currently, a specific share of expenses for electric bills amounts is nearly up to 15% for railroad networks, including 8% for electrified railroads thus exceeding all other costs being second only to the wages fund.

Main objective: Cutting down the cost of electric bills

In modern conditions, when the federal wholesales market of energy and power (FOREM) is being formed, the main way to cut down the costs is nothing but the provision of railroads with the state-of-the-art time-of-use (TOU) meters, introduction of automated meter reading systems (AMR) and entering the FOREM.

Integrated solution: Installation of TOU meters and AMR

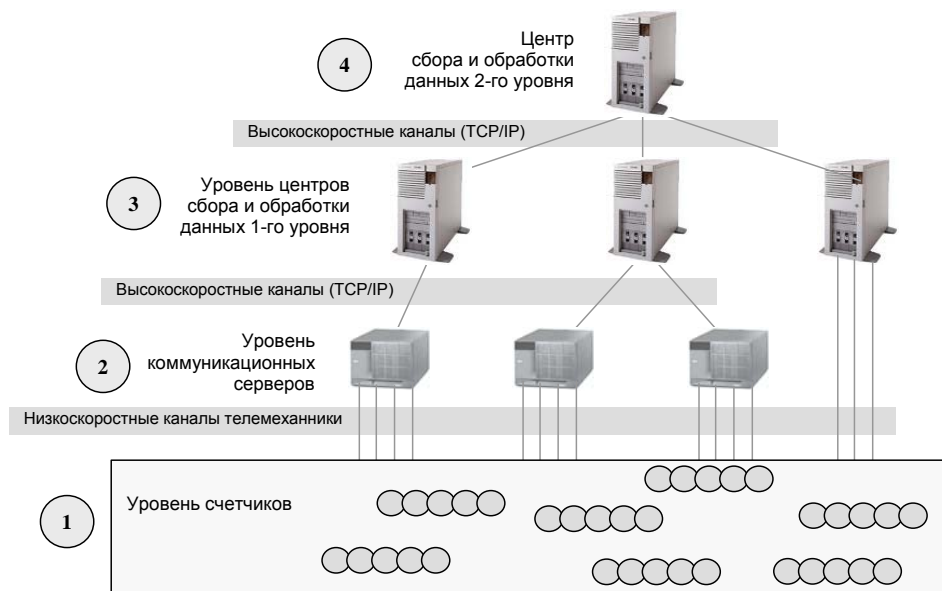
Introduction of new technologies was carried out by stages. During 1997-2000, more than 2,000 electricity ALPHA meters were installed throughout the railroad covering basic commercial billing activities. Total for railroads of Russia it was produced 10,000 ALPHA meters.

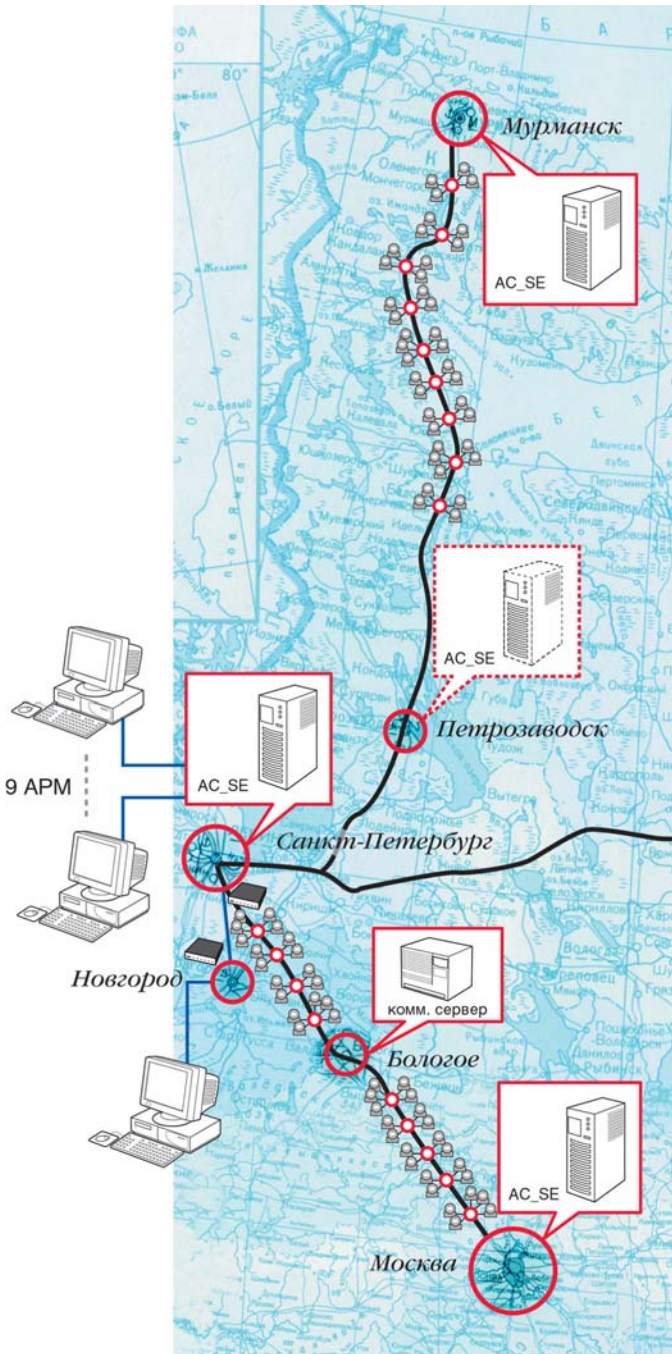
In the year 2000, in the framework of metering automation activities, the Alpha CENTER AMR system was launched. The Alpha CENTER AMR system was designed by Elster Metronica's engineers and programmers with regard to specific needs of large consumer enterprises and power utilities. Data collection and processing centers form the basis of the system.

System structure

In the framework of the project, the data collection and processing system as well as the data display system can be distinguished. The structure of the data collection system is represented by the four-level architecture:

1. Meters level.
2. Communication servers level.
3. 1st-level data collection and processing centers level.
4. 2nd-level data collection and processing centers level.





This architecture made it possible to organize data collection from a vast territory. Currently, three communication servers located in Moscow, Bologoye and Petersburg are collecting data from traction substations spaced at several hundred kilometers. The specific feature of this project is a joint utilization of communication channels with the remote control system that imposes limitations on the meters handling rate (50 Bd). Communication servers collect data according to a schedule that can be flexibly adjusted.

For instance, if the meters interrogation is performed by means of conventional telephone lines (automatic telephone exchange), then in the day-time the lines can be used by the plant personnel, and at night can be switched over to the data collection system.

Every communication server simultaneously collects data from several communication lines. Several communication servers operating in parallel deliver data to one database server (the 1st level data collection and processing center). Data collection and processing are fully automated.

The software package keeps a continuous track of data completeness and performs additional collection of data that are missing. Then these data are automatically involved in calculations. As the result, the system users continuously follow actual power demand conditions. Information in this case can be represented with a various degree of detailing.

The data collection and processing centers are organized on the basis of servers Windows NT. The professional multiuser ORACLE DBMS is used as the database. The software has the client/server architecture. In the Alpha CENTER version 2.05.5 the applications load balancing has been performed, thus making it possible for remote users to communicate with the database using conventional telephone lines. Alongside with this, the entire system has a multi-level data protection system (on the OS level, on the DBMS level, on applications level).

Metering system of Oktyabrskaya railroad (Moscow-Sankt-Petersburg-Murmansk) comprises 2,000 ALPHA meters

Software content

Applied software and maintenance documentation are supplied on CD (415 Mb).

Applied software includes:

- Communication server.
- Calculations server.
- System control modules.
- Package for generation of a basic set of users with an access right differentiation
- Database scheme image (dump) with a completed reference data system.
- Client's software (screen interfaces, reports generating modules).

The delivery includes a coordinated DBMS ORACLE (standard edition) version provided with engineering support for a period of one year and a complete set of applications software installation packages for applications server, communication server and the user workstations.

The advantages of integrated solution represented herein are as follows:

- Parallel data collection
- Parallel calculations and diagnostic system.
- Multiuser mode of operation
- Client/server architecture
- Scalability and extensibility

Final results:

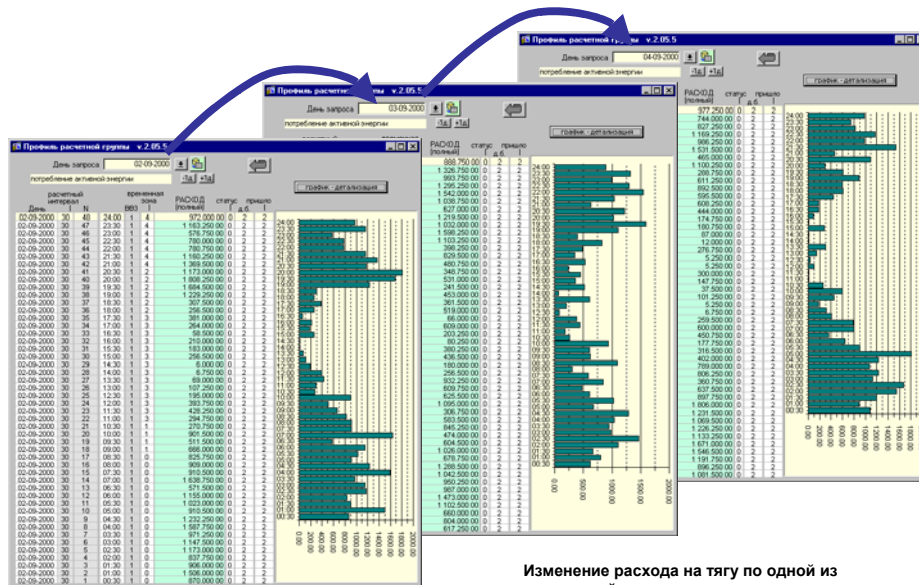
The meters and the system handling expertise testifies to a high efficiency of the solutions applied, namely: reduction in power consumption for hauling operations, overall cutting down of the railroad electric bills costs and reduction in the unit power consumption per unit of cargo conveyed.

These results were obtained due to

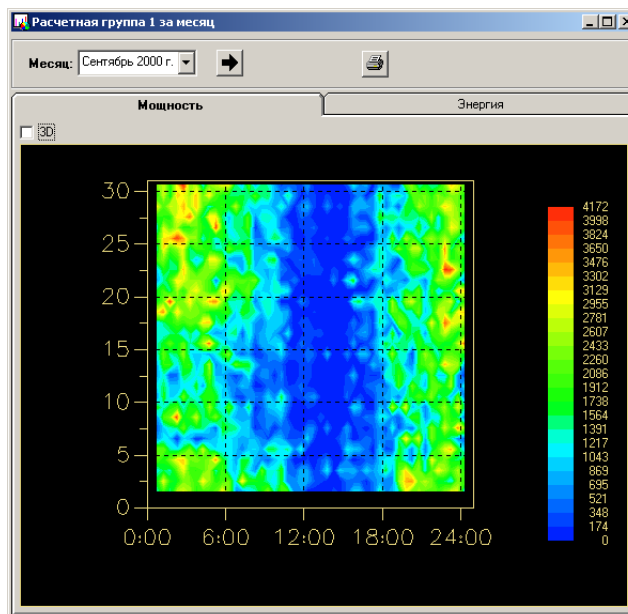
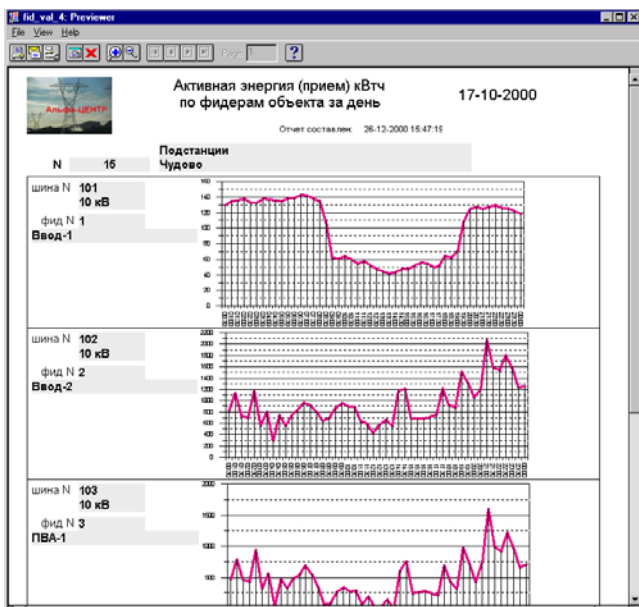
- Increased energy metering accuracy.
- Transition to time-of-use energy billing.
- Reduction of the customer contract demand during the power system peak hours.
- Load control.
- Organization of data collection from the ALPHA meters installed.

Comprehensive energy resources metering

The next step in the work planned to develop the integrated AMR system for Oktyabrskaya railroad will be elaboration of the automated energy resources metering system for the Oktyabrskaya railroad energy-intensive enterprises (depots, terminals, stations). Introduction of this system will allow the enterprise to organize metering of consumed electrical and thermal power, including hot and cold water, gas by means of installation of energy, heat, water and gas meters and, consequently, to proceed with payments for consumed and metered resources in settlements with their suppliers.



Изменение расхода на тягу по одной из подстанций за три дня.



Examples of Alpha CENTER AMR system screens