CCNS for Brestenergo

Converged Corporate Network Solutions allow LAN connections over high-voltage Power Line Carrier

Reference
The Brestenergo Project – Belarusian electricity for Poland

POLAND TO EXPORT ELECTRICITY FROM BELARUS

Poland is getting ready for exports of electricity from Belarus. A new distribution station and electricity transmission line for transferring electricity from Belarus has been put into operation in Poland. Electricity supplies from the Belarus Berezovskaya electricity station will start in the new future, the Delta agency reported.

ABB’s Communication, Protection & SCADA solutions are key for the control of this international power grid.

BELARUS / Brest

The Republic of Belarus is an independent state. The geopolitical location of Belarus is favorable. It borders the Russian Federation in the East, Poland in the West, Lithuania and Latvia in the North and the Ukraine in the South.

Brest is the administrative center of the Brest region. The city is located on the right bank of the Western Boog River and is next to the border to Poland.

Solutions for coming IP traffic requirements

The overall power network is managed with two interconnected MicroSCADA in stations Brest-2 and in Berezovskaya power plant; for remote control, additional X-terminal sessions can run in Brestenergo. To exchange this SCADA data, a LAN extension to the various sites was required. Two integrated bandwidth- and transmission-media-optimized solutions were implemented:

- As optical fibres between Brestenergo and Brest-2 are a premium, using an additional pair for only the LAN connection was not really an option. As these two stations are however connected by FOX515, the plug-in card LAW A4 has turned out to be a very cost-effective solution which provides with its 10BaseT interface enough LAN bandwidth. The LAW A4 can be used as switch or router and is fully managed via the FOX515 management system, means changing LAN parameters is just a task of few mouse-clicks.

- For the about 120 km 220 kV interconnection between Brest-2 and Berezovskaya, no optical fibres are available. As the overall data & voice channel volume is relatively low, a PLC-based communication concept was chosen. Figure 1 shows the highly efficient use of the available PLC bandwidth, allocated to the services to be transmitted:
  - 8 protection commands
  - 2- & 4-wire telephone services
  - up to 28,800 bps for IP traffic coming from CISCO Router
Combining traditional PLC with latest IP technology

**Dynamic PLC – speed adaptation as key feature**

Large variations of noise on the high-voltage lines may cause static digital PLC systems to fail or require conservative bandwidth planning, hence jeopardizing the speed advantage. With its dynamic speed adaptation, ABB’s digital PLC solution with the AMX multiplexer always achieves the highest possible transmission rate and preserves communication even under adverse channel conditions caused, for example, by heavy icing on the lines.

The via X.21 to AMX connected router (CISCO 805) synchronizes to the available line speed given by AMX. This solution provides therefore varying IP bandwidth between 28.8 kbps and 14.4 kbps. This does not seem to be too exciting, but completely fulfills the real requirement without heavy investments for fibre installations or continuous cash-out for high-priced leased lines.

**How Brestenergo sees the benefits of the ABB solutions**

The Chief of Telecom of Brestenergo, Mr. Nikolay Marchenko, expressed the benefits of the overall integrated communication systems as follows:

“We are proud to have a highly integrated utility communication system, which makes best use of available assets. With running even IP applications over PLC, we have found a way of overcoming the existing lack of installed fibres between some of our sites. By the extension of the SCADA control LAN even over the border to our partners in Poland, we have created a future-oriented infrastructure which allows a reliable and efficient power network management. Compared to earlier times, we also could reduce the overall maintenance costs.”

Mr. Nikolay Marchenko
Chief of Telecom, Brestenergo

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**Figure 1: Highly efficient use of PLC bandwidth**
FOX515: Versatile combined access & transport multiplexer for utility applications, including protection, legacy data, voice, and LAN connectivity.

NSD70: Stand-alone teleprotection device providing maximum flexibility for all command transmission schemes such as blocking, direct transfer tripping and permissive transfer tripping with extremely short transmission times over all transmission media, i.e. pilot wires, optical fibres, PLC, and radio.

NSD550: Plug-in card into the ETL582; NSD550 can transmit up to four commands with two different modes of operation, i.e. either 2 permissive + 2 direct trip, or 3 permissive + 1 direct trip commands.

AMX500: The voice & data multiplexer AMX500 takes special account of the difficult transmission conditions on high-voltage power cables. The robust transmission system renders the system especially suitable for use via PLC links. A sophisticated fall-back & forward algorithm adapts speed to changing line conditions.

ETL582: Member of the ETL500 family of software programmable Power Line Carrier systems (PLC) for the transmission of speech, data, and protection signals over high-voltage lines. Latest signal processor technology permits tailor-made solutions for each specific application, with optimal operating behaviour.

NSK5: FSK Modem for SCADA.

CISCO805: Router with one 10 Mbps LAN port and a serial port providing connectivity to EIA/TIA-232, EIA/TIA-449, EIA/TIA-530, EIA/TIA-530A, X.21 and V.35 data terminal equipment (DTE) or data communications equipment (DCE).