



Communications

Communications offers solutions for all communications requirements in the transmission and distribution networks of power utilities and industries.

Communications is integral to modern electrical power system management

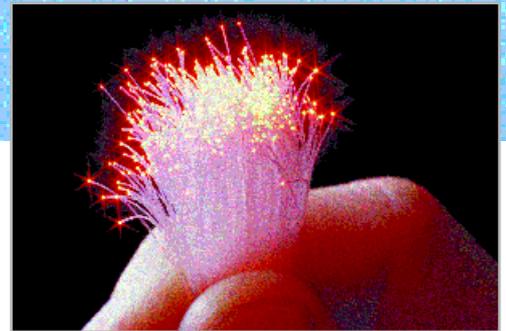
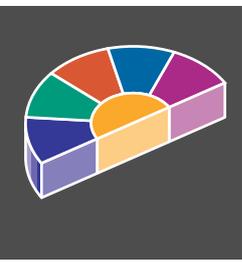


ABB Network Partner





The total proposition

Panorama is the standard for a comprehensive range of integrated solutions for efficient and reliable management of power networks. Using innovative information technology, Panorama delivers total control of the power process, from generation to consumption. The Panorama standard covers six application areas, each offering specific solutions.



Station Automation & Protection

Station Automation and Protection includes control, monitoring, and protection for power plant, transmission, and distribution applications. Solutions range from single function protection and control units to fully integrated, comprehensive, high-performance substation automation systems.



Network Management

Network Management enhances operation of interconnected power networks. It provides integrated solutions that optimize energy supply while maximizing reliability on both transmission and distribution networks.



Business Management

Business Management provides the tools and solutions to help energy companies grow profitably in today's changing market place. Systems for wholesale and retail energy supply and transportation provide the foundation for success in the competitive environment.



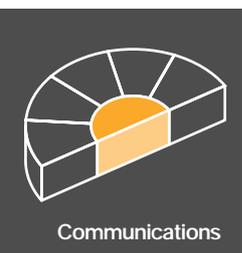
Meter & Load Management

Meter and Load Management comprises electricity metering products and integrated systems for automatic meter reading, and load management.



Consulting & Services

Our comprehensive range of consulting and other services includes pre-studies and situation analysis, technical specifications and advice, feasibility studies, training, installation, commissioning, maintenance, repair and help line.



Communications

Communications offers solutions for all communications requirements in the transmission and distribution networks of power utilities and industries.

Communications keeps the power flowing

ABB serves customers in power generation, transmission, distribution and numerous other areas. Electrical engineering expertise built up over one hundred years has enabled us to develop optimized systems, products, and services for the management, automation, control, and protection of power networks.

We have developed the Panorama standard to serve all players in both deregulated and regulated power markets. Panorama ensures all our systems, products and services within network management, automation, control, and protection can be fully integrated.

As a cornerstone of the Panorama standard, ABB offers a full range of communications solutions. These solutions fulfil the highest demands with respect to safety, reliability, and real time response.

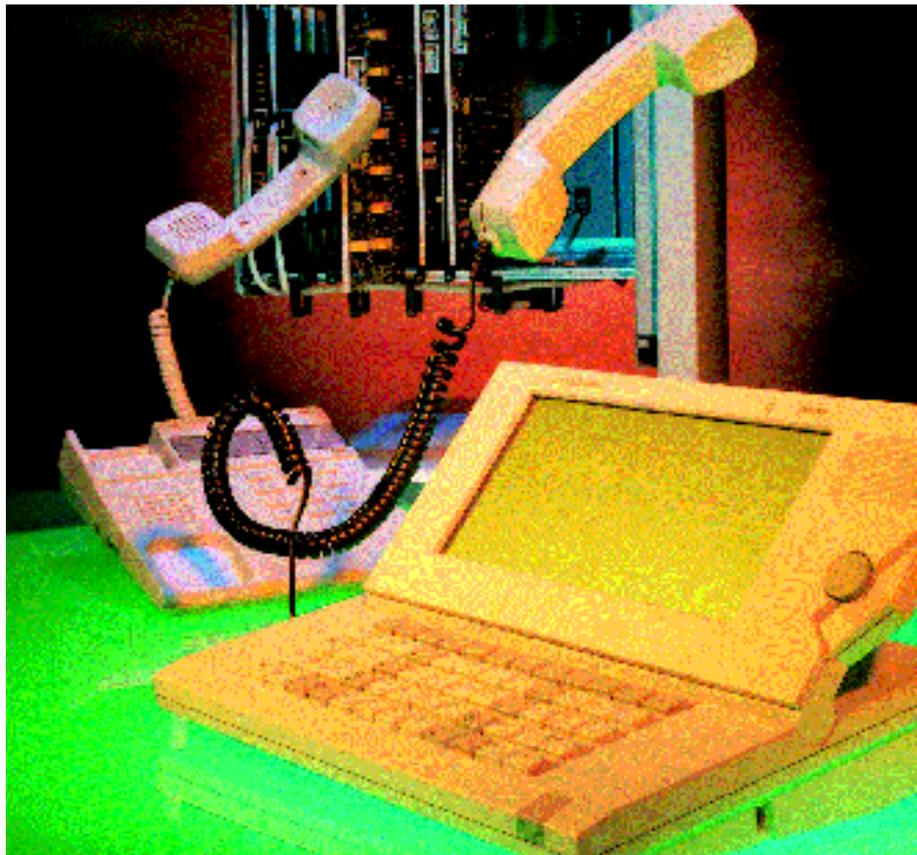
Linking the power network together

Without an efficient communications network, modern power systems would be unthinkable. Operators communicate with each other to coordinate actions and exchange all kinds of operational information. The communications network conveys signals for the remote control of unmanned stations, to transfer data and load values from sites across the power system to central control, and transmits central control commands to the sites. And most crucially, the communications network carries many of the vital signals that have to be instantly exchanged in real time between different locations to ensure optimum control of the power system.

In short, communications networks help power utilities keep electricity flowing all the way from generator to consumer.

Reliable communications deliver higher power system availability

ABB's communications expertise is based on the experience gained from installations in over 140 countries. This experience, allied to tried and



tested solutions, is especially important in protection signalling where communication enables protection systems to clear a line fault in the shortest possible time, or to isolate primary plant components directly affected by a fault, and thereby maintain the availability of all other components.

The enhanced functionality and performance of our communications systems increase both the volume and quality of information available for operational and management functions. And by enabling all business units within a power utility to have ready access to this information means the same information can be used on-line for the remote control of substations, and for evaluation purposes, to minimize maintenance and repair costs, for instance.

An efficient communications network is essential for modern power systems.

Integrated communications solution for electrical utility requirements

For modern power utilities, powerful and reliable communications services are absolutely vital for the control, supervision, and administration of power system operations.

Rapid developments in technology in recent years together with the continuing deregulation of power markets, have significantly changed the communications requirements of power utilities.

In addition to established PLC (Power Line Carrier) techniques, which, thanks to their high reliability, relatively low cost, and long range, continue to have an important role to play, today's communications platforms include the entire spectrum of broadband products. These extremely powerful communications networks are usually optical fiber based. The exceptionally high transmission capacity of optic fibers enables them to handle both operational and administrative power utility data, and to provide commercial telecommunications services.

Integrated communications network management is an important feature of digital broadband equipment. Only an efficient network management system can achieve maximum availability at minimum maintenance cost to deliver the greatest benefits to users. It enables the remote supervision, diagnostics and configuration of equipment at any location. Integrating all these functions into one single ABB system ensures your investment will operate at maximum efficiency.

Working closely with our customers

Close cooperation with you throughout the life time of a system is fundamental to our service philosophy. Supporting you at the earliest opportunity – often from the initial planning and specification stage – gives you the confidence, right from the start, that our future-oriented technology is the right choice for you.

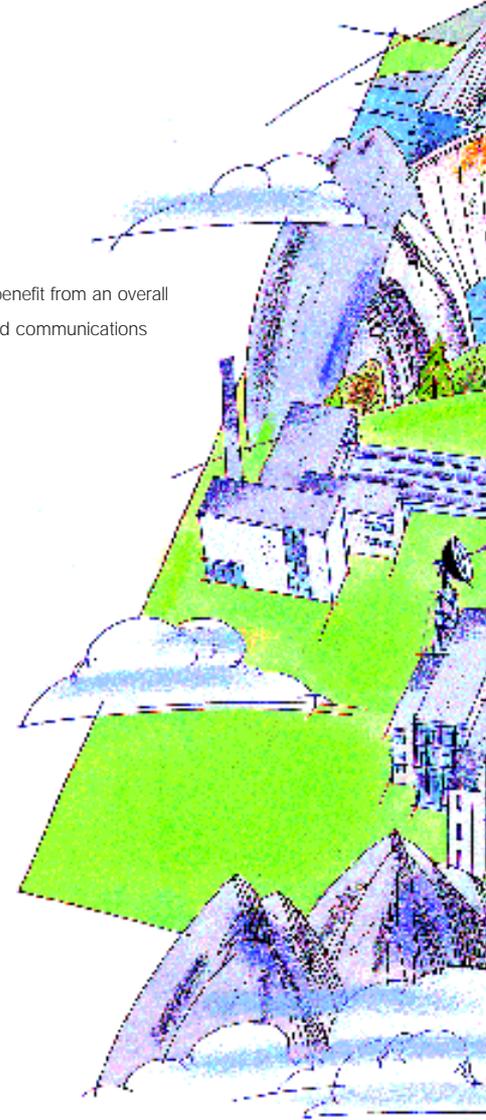
For us, ongoing cooperation as the project develops is a natural progression, and this extends beyond contract management, supply, installation and commissioning, to encompass the entire operational life of the system. The level of cooperation is open to mutual agreement.

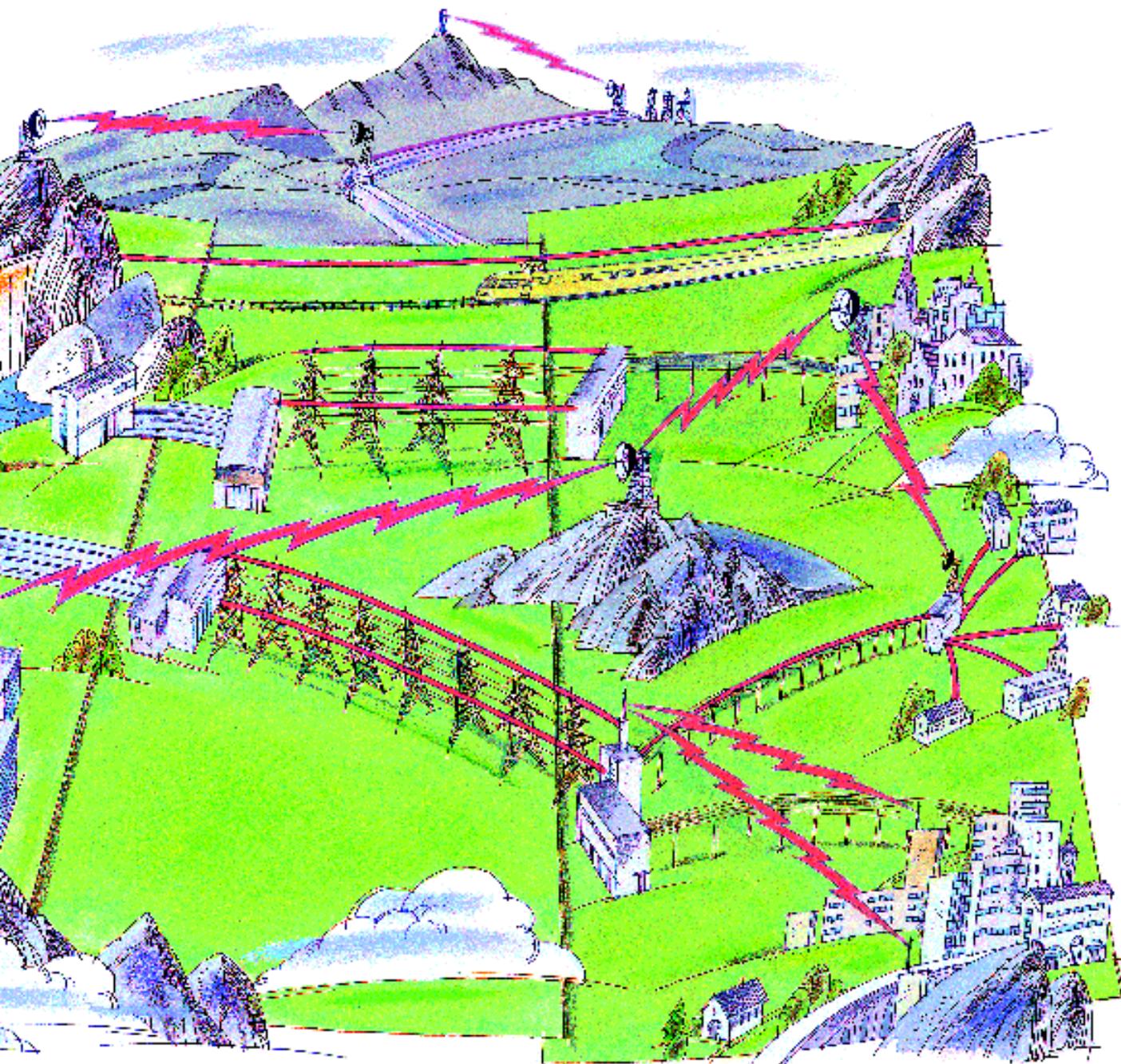
Total investment flexibility with ABB

Most power utilities already have a communications system or systems, possibly with a mix of technologies, some of which operate in isolation. Our technology and engineering capabilities to integrate different communications techniques and media into a single hybrid communications network, ensure you will continue to benefit from earlier investments. This also minimizes the need for new investments while raising performance to the standard necessary to compete in today's competitive energy markets.

ABB has the know-how and access to all significant communications technologies to pro-

Utilities benefit from an overall integrated communications solution.





pose solutions that embrace the best technology and media relative to your present and future requirements, power system topology, existing communications equipment and investment budget. Our global experience in implementing communications projects worldwide enables us to offer customized solutions that smoothly integrate ABB systems and existing communications systems whatever the transmission medium and third-party products installed.

Communications applications and solutions from ABB:

APPLICATIONS

- POWER SYSTEM CONTROL
- POWER LINE PROTECTION
- OPERATIONAL TELEPHONE SERVICES
- LAN INTERCONNECTIONS
- VIDEO SURVEILLANCE
- REMOTE DIAGNOSTICS & SUPPORT
- DISTRIBUTION AUTOMATION (DA)
- AUTOMATIC METER READING (AMR)
- STANDARD TELECOM SERVICES

SOLUTIONS

- FIBER OPTIC SYSTEMS
- MICROWAVE RADIO
- SYNCHRONOUS DIGITAL HIERARCHY (SDH)
- INTELLIGENT MULTIPLEXER
- POWER LINE CARRIER (PLC)
- TELEPHONE EXCHANGES
- DISTRIBUTION LINE CARRIER (DLC)
- UHF/VHF RADIO NETWORKS
- COMMUNICATIONS NETWORK MANAGEMENT SYSTEMS

Specific solutions for transmission networks...



ABB supplies turn key communications systems that meet future requirements for higher transmission capacity.

Line protection

Communications equipment for line protection must offer the maximum dependability and security with the shortest transmission times. For some protection schemes, a communications channel is essential, and while a communications channel may not be necessary for others, they will perform better with one.

Teleprotection (transfer tripping) equipment operating in conjunction with line protection has to be capable of reliably transmitting a signal to the remote end of the line in the shortest possible time under extreme interference conditions (power system fault).

ABB transfer tripping devices are available for various transmission media and are in operation all over the world. Thanks to their clearly defined zone of protection which offers better discrimination, current comparison schemes have always been popular, but hitherto restricted by the availability of high speed communication channels. With the growth of information technology and digital technology, suitable channels are now available enabling the use of current comparison protection to become more widespread in the future. In particular, ABB's optical fiber or microwave broadband communications systems provide the necessary real time performance to transfer current amplitude and phase information fast enough for accurate comparison at both ends of a line.

Power system control

The availability of electric power is largely dependent on the reliability of the power control system. Accordingly, control systems, and the associated communications equipment in particular, must function reliably under worst case operating conditions.

The capacity required for conventional telecontrol applications (SCADA, Energy Management Systems, EMS) is generally relatively modest. As newer, more efficient power system control procedures are

introduced to meet the needs of deregulated energy markets, more capacity will be needed.

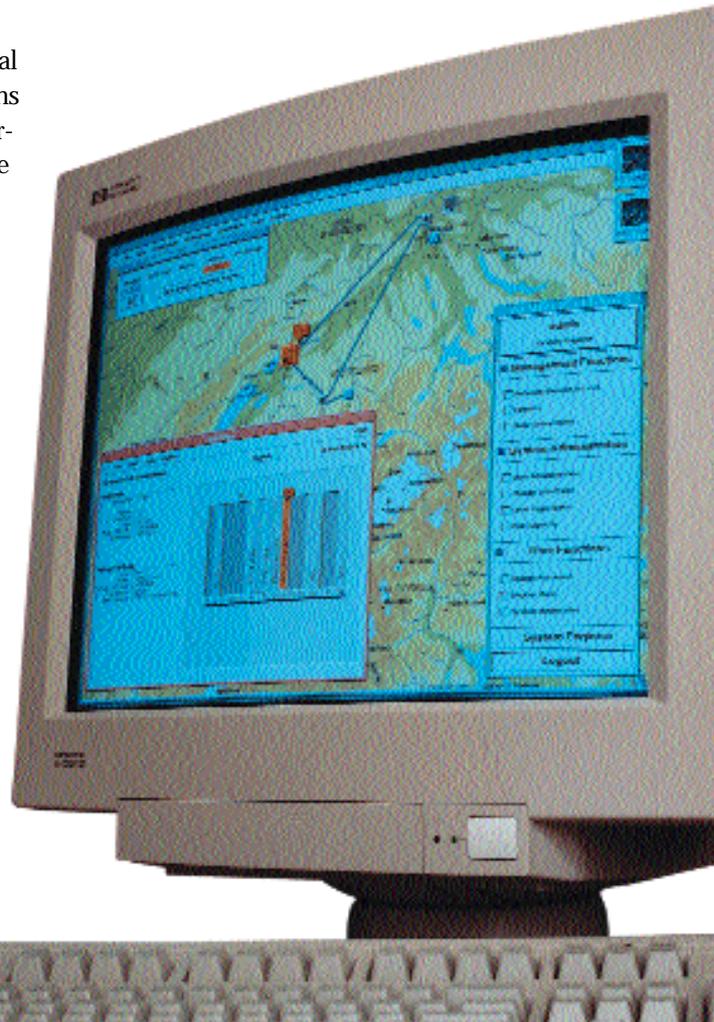
Distributed control system architectures for energy management demand higher transmission capacities. The communications infrastructure ABB can supply today already meets these future requirements.

Service telephone and video surveillance

A reliable and secure telephone system is still an indispensable tool in power system control, as efficient load dispatching and the coordination of switching procedures are usually executed by telephone.

Remote controlled video stations are ideal for the surveillance of unmanned substations, especially for inaccessible locations. Equipped with the appropriate interface, today's broadband systems can transmit high quality video signals.

ABB has the know-how and experience to design and implement both operational telephone systems and video solutions.



...and for distribution networks

Power utilities are under growing pressure to improve their service and quality of supply. In addition to optimizing the services they provide, distribution utilities are increasingly buying power from the cheapest supplier.

To support these activities, ABB has developed a communications concept called DartNet® which provides distribution utilities with a single integrated solution for all applications at distribution level, including distribution automation, meter reading, and load management.

Distribution automation

ABB's DartNet system has been especially designed to facilitate the automation of existing distribution systems. Its compact, cost effective units are installed at the various nodes in the distribution system to interface between primary equipment and the control center. The communications concept includes high data transfer rate modems for transmitting information via power lines (distribution line carrier) and other communications media such as specialized radio systems, optical fiber, or telephone lines. Intelligent node controllers and communication servers organize the secure flow of signals through the various media on the communications network and the changing structure of the distribution power grid.

A single versatile SCADA platform can control and supervise a distribution utility system in real time. It locates faults, controls switches and reroutes the supply from a control center, if necessary. The status of the primary plant is also monitored so that maintenance can be demand lead, to eliminate costly routine maintenance. Automated distribution systems achieve faster recovery and shorter repair times and so improve the quality of supply to the consumer.

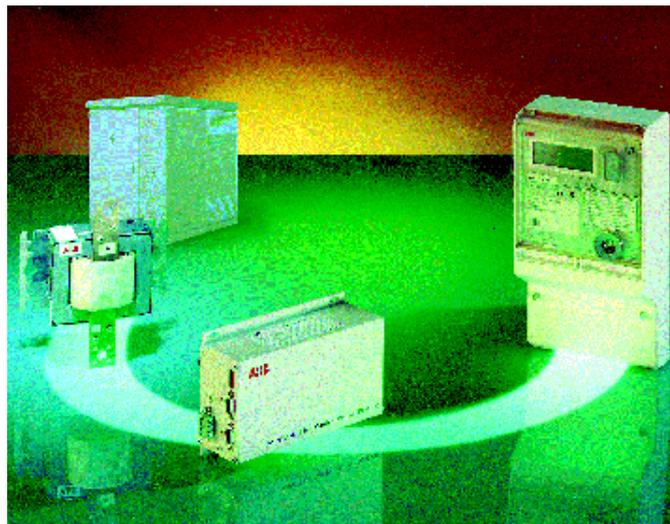
Meter reading and load management

Automatic meter reading is a convenient means of acquiring customer information, e.g. power usage patterns. This also enables dynamic tariff

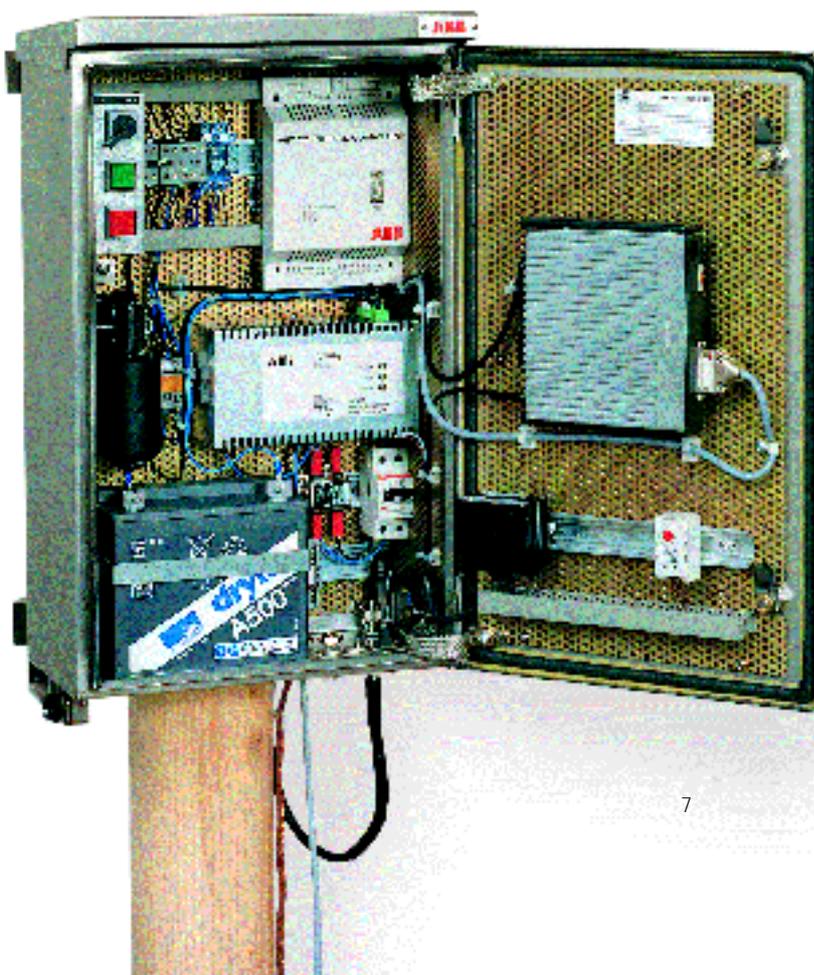
changes, eliminates the need to gain direct access to meters, and provides simple tamper detection.

Metering information from various points in the system can be made available simultaneously to provide the basis for faster, more flexible, highly efficient load management.

The ABB communications concept is based on meters with integral power line modems plus other communications media such as radio, optical fibers or telephone lines. The major benefit for power distribution utilities is a single communications system for automation and meter reading.



Our communications systems facilitate the automation of existing distribution networks. An automated solution delivers better quality of supply and more efficient load management.



A complete range of products and services to guarantee systems performance

To implement the communications solutions described in the previous section, ABB offers a wide range of communications products including all hardware and software, plus service packages tailored to your exact requirements.

An open systems architecture and the modular adaptability of individual products enable us to engineer solutions to your precise application needs. We offer a series of interfaces to accommodate both special user and standard applications.

A comprehensive communications network management system where all the communications network components are integrated into a single system, offers the maximum benefits.

Optical equipment – robust solutions tailored to specific communications tasks

Wide bandwidth, high bit rate and immunity to electrical interference, make optical fibers the most important communications medium today. Our product range includes the latest optical terminal equipment that not only meets today's requirements, but can also handle new applications and the capacities that will be required tomorrow.

ABB specializes in high capacity optical fiber transceivers for applications over very long distances using SDH (Synchronous Digital Hierarchy) multiplexing techniques (e.g. links over 300 km without repeaters).

Optical communication is the best solution for private digital networks and remains economically viable even when only a few channels are required. ABB also supplies optical equipment for the transmission of relatively low data volumes from harsh HV switchgear environments to the terminal unit connected to the backbone communications system.

Microwave radio – an advantageous option in difficult terrain

Our microwave radio product range includes digital transmission equipment for a wide range of frequency bands and transmission rates for both PDH (Plesiochronous Digital Hierarchy) and SDH applications. Radio communication is

not restricted to power line routes, and can, in certain circumstances, offer an advantageous alternative, especially in difficult terrain. By judiciously applying microwave and optical links, ABB can engineer the optimum communications network topology for you.

SDH – standard communications technology for power utility applications

SDH is the most recent multiplex technology for high capacity communications systems. It can be used in optical and microwave radio systems.

High availability and advanced network management functions makes SDH ideal where high data transfer rates up to e.g. 10 Gbit/s are needed. Based on the latest standard SDH products from our partner Nortel (Northern Telecom), we have developed an all-inclusive systems solution to cover all power utility communications requirements.

Our SDH products permit a cost effective solution to be engineered for every application and can also integrate existing communications products.

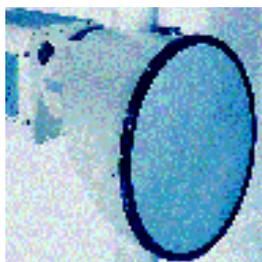
Access multiplexer – interfaces for every type of signal

The access to SDH highways through multiplexers has to be carefully designed and interfaces provided for a multitude of different types of signals, including simple binary I/O contacts, time-critical protection signals, voice communication, low speed SCADA, video surveillance, high speed data transfer, Internet access and LAN connections. All these signals then have to be multiplexed into standard data channels.

ABB multiplexers handle all the different types of signals correctly and transmit them efficiently and reliably through a complex hybrid communications network. We offer multiplexers for all capacities ranging from a small number of 64 kbit/s channels to intelligent ATM (Asynchronous Transmission Mode) multiplexers. Our access multiplexers have proved their high reliability and availability in countless power utility applications.



Optical fiber solutions offer high data bit rate and immunity to electrical interference.

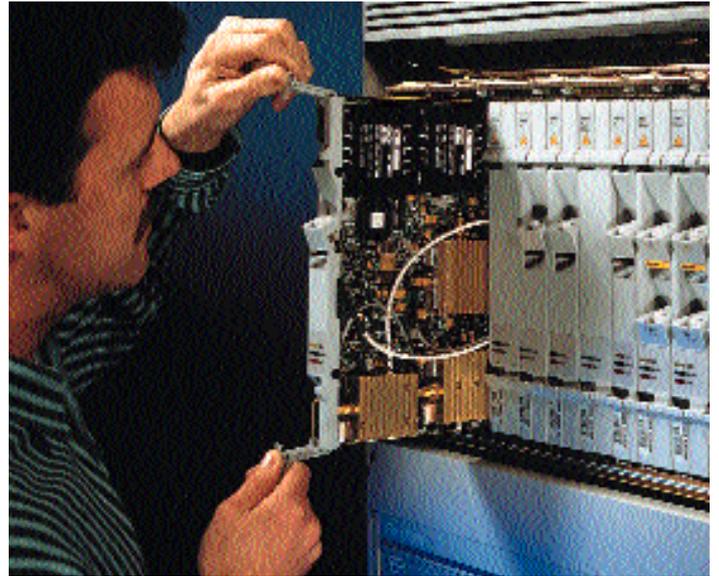


Microwave radio is an ideal alternative in difficult terrain.

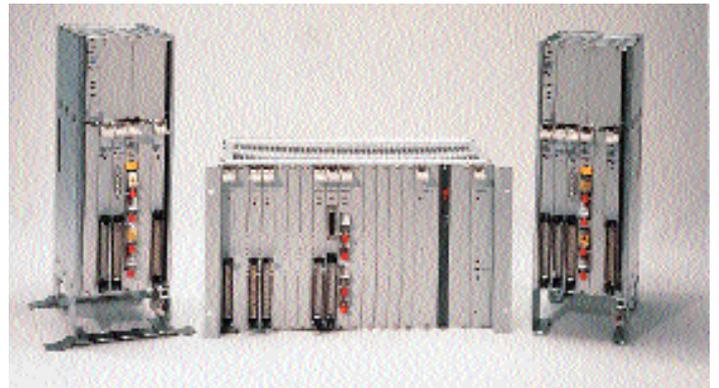
Power Line Carrier (PLC) – reliable and cost effective communications for power system control and protection

An existing PLC network represents a considerable investment made by a power utility over a period of many years. It is therefore not generally feasible to replace it with a broadband system. PLC is still the most cost effective solution for power utility installations where low volumes of data and protection signals have to be transmitted over long distances.

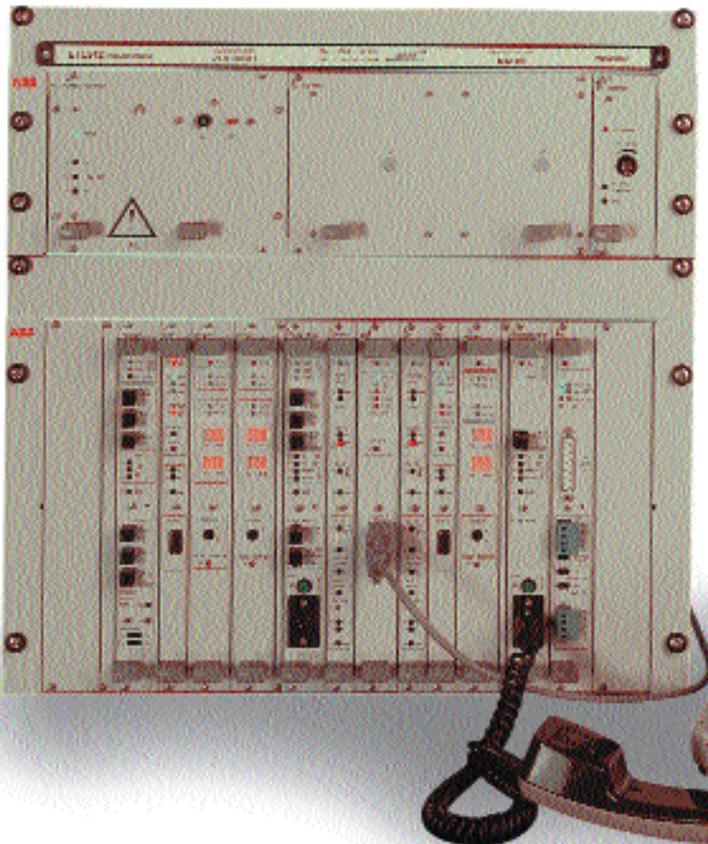
As the leading supplier of PLC and teleprotection systems, ABB has the experience, know-how, and resources to engineer the best possible solution however complex the application. The PLC services we offer include network studies, noise and propagation analysis, and frequency allocation planning to determine the most suitable frequencies to ensure optimum performance.



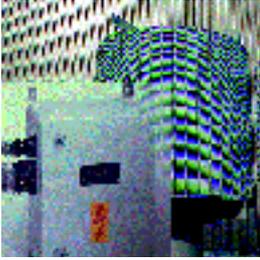
SDH – High capacity systems for all future requirements.



FOX-U is a fiber optic terminal and multiplexer for every type of signal.



PLC is a cost effective solution for power utilities where protection signals have to be transmitted over long distances.



Coupling equipment for PLC.



Intelligent node controller for distribution communications systems.



Special telephone system for power operators.

With transmission capacities up to 64 kbit/s, digital PLC links can also serve as a backup to increase the availability of important operational channels normally provided by other communications technologies. In an integrated communications network, our latest PLC equipment is remotely monitored and configured by the communications network management system.

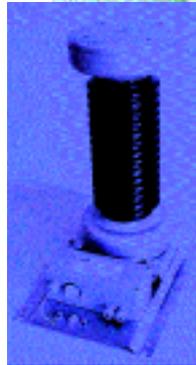
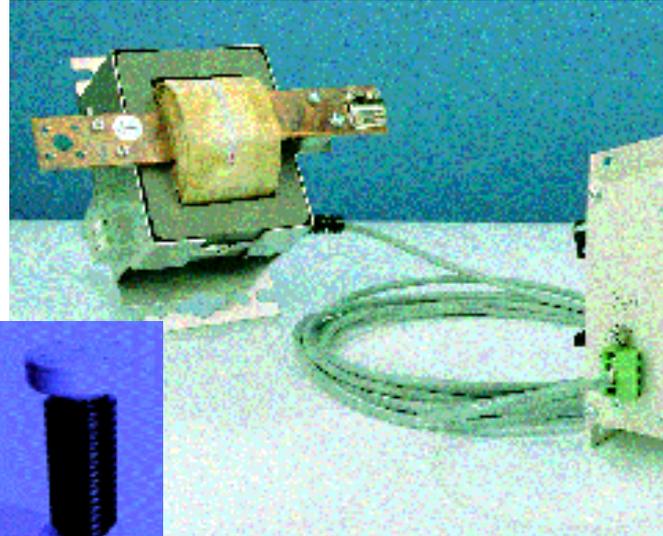
PLC signals are coupled to the power line by a coupling capacitor and coupling device. A line trap in the power line confines signals to the particular line and prevents signals from being short-circuited by the switching condition in the substation. Our full range of products enables the best solution to be engineered for every case.

Distribution Line Carrier (DLC) – reliable communication with remote stations and consumers

The optimization of power distribution communications demands architectures and protocols that can handle a large number of small stations. DLC is one of the cheapest and most efficient means of providing communications at distribution level. In principle, DLC is based on the same technology as power line carrier, modified to cope with the much more complex network structure and noise conditions of MV and LV power lines. Our compact DLC modems matched to the operating conditions in LV and MV power systems provide two-way communications via the power line, and handle data for station monitoring and automation, load management, and meter reading.

A coupling device injects the signals from the DLC equipment onto, respectively extracts signals from, the MV/LV power line. At MV level, a simple solution is inductive coupling direct to the cable shields. However, both capacitive and inductive coupling devices are available and can be used together on mixed underground cable, and overhead line, MV power networks.

Combining DLC with intelligent node controllers permits communication for every purpose, from end user up to the control center, and is



DLC is an efficient way of providing communications at distribution level.

the basis for distribution system control and load management in a deregulated energy market.

UHF/VHF radio terminals – tailored to data and voice communications

Narrowband radio is the ideal communications medium for many private networks and for distribution automation in particular. In many cases, this is the only cost effective means of communication and an ideal complement to DLC systems.

Our products are available for point-to-point, and point-to-multipoint fixed frequency links as well as for trunked Private Mobile Radio (PMR) systems. The protocols used are suitable for signalling and packet data communications. The integrated modem makes communication transparent and is tailored to handle data efficiently.

Telephone exchange – essential voice communication for safe systems operation

Reliable voice communication is an essential tool for power system operators. We offer telephone communications via public and



private lines designed to support a number of specific ancillary services that enable the user to control and operate the system faster, safer, and more conveniently.

Communications network management systems – communications at your fingertips

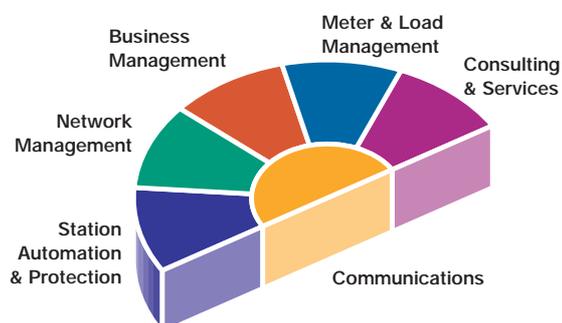
We are rapidly approaching the stage where all control functions and systems will rely, to a greater or lesser extent, on the communications network. The capacities and functions required are therefore increasing all the time. The steady growth in the importance and complexity of modern communications networks necessitates an intelligent management tool to ensure they are operating efficiently and can adapt quickly to changing requirements.

We supply a single communications network management platform for our SDH products and access to multiplexers, and provide support for integrating existing communications networks into a single communications network management system. This system includes functions for emergency channel rerouting, remote configuration, and updating of communications devices through software downloads.

There are many more means to communicate

In addition to the main ABB communications systems and products mentioned above, we also supply solutions embracing satellite communications, video transmission, coaxial cable transmission, paging systems, connections to public telecommunications networks and more.

Installation and commissioning, as well as training, are normally included in our turn key solutions.



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