

Automation Support & Services

Innovative and Customized Solutions for Grid Automation Coverage

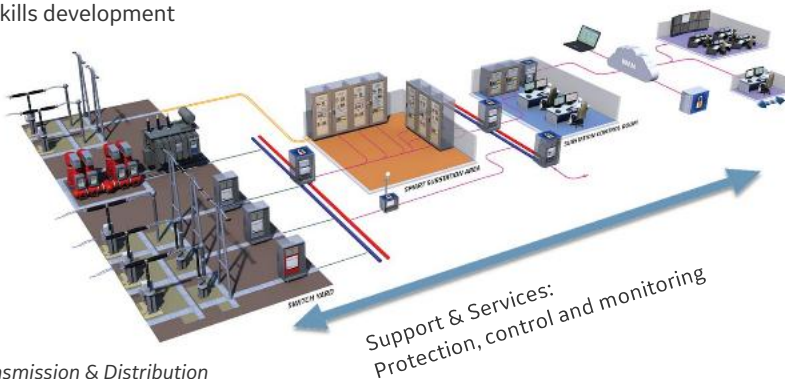
As a world leader in the design, manufacture and supply of protection, control, recording and monitoring systems for grid utilities and industries, Grid Solutions provides a comprehensive range of support and services tailored to your needs.

For Energy Savings, Network Security and Cost Efficiency

Digital devices, compatible communication protocols and advanced technologies can improve transmission and distribution network efficiency substantially. Nevertheless utilities, industries and energy sector providers still face concerns of financial performance, return on capital employed, security and profitability. Therefore, once installed, substation equipment should be thoroughly maintained, the control system architecture continually updated, and operating skills constantly enhanced throughout the equipment's life time.

In response to stability and reliability expectations, Grid Solutions offers effective ways to save energy, ensure network security and optimize cost. Its complete range of support and service solutions target following issues :

- Equipment and system unavailability
- System and product failures
- Installed base age/obsolescence
- Life cycle management (R&D follow-up)
- Modernization and extension
- Technology evolution
- Skills development



Transmission & Distribution
from LV to 1,000+ kV AC and HVDC



Device Fleet Management

- Complete range of customized services to ensure equipment service continuity and full availability
- Long term preventive and periodic onsite device maintenance
- Proximity with local service personnel and remote operations support
- 24/7 Support service on critical issues and site attendance
- Installed base maintenance for life extension and increased reliability and performance, thus return on investment

Modernization & Retrofit

- Adaptation of solutions to current needs and technology advances
- Reliable product and system obsolescence management
- Panel door or rack replacement solutions

Commissioning & Testing

- Pre-commissioning tests
- Protection & control scheme tests
- Bay control schemes and substation control system tests
- Operational safety standards (personnel and equipment)

Technical Training

- Advanced training centers providing power system fundamental and detailed product training courses
- Courses can be customized and delivered at your site on demand



Grid Solutions' Automation Services Offering

Investing in quality, innovative equipment that optimizes your electrical structure and raises your return on investment is more than essential. Once the equipment is installed, Grid Solutions can assist and advise you to ensure continuous and optimized grid operability throughout the equipment's life time.

Based on multi-year manufacturing expertise and extensive experience in refurbishment, Grid Solutions offers the most cost-effective and efficient solutions to increase the life span of your substation automation equipment.

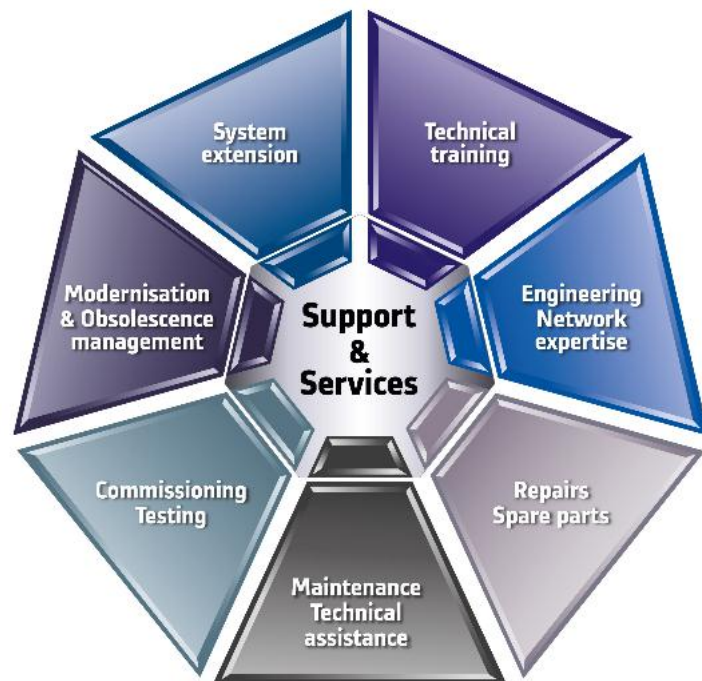
From onsite assessments and periodic inspections through to complete life extensions, we offer individualized programs to enhance your personnel's skills and maintenance of your equipment tailored to system and product types, age and ratings.

Scope of Supply

- Maintenance contracts
- Renovation and modernization plans, obsolescence management with software and hardware compatibility
- Extension projects
- Commissioning and testing of existing and additional equipment
- Repair services and spare parts
- Standard and customized training matched to skills development plans and new technologies
- Electrical network consulting to reduce operating costs and optimise customer investment

Customer Needs

- Improvement in equipment and system availability
- Reduction in outage times
- System & product failure analysis and resolution
- Installed base age / obsolescence assessment and management
- Lifecycle management
- Modernization & Extension
- Cyber-security
- Technology update: protocol, standards, maintenance tool (SMT)
- Skills development: new employees, knowledge refreshment, competency management



Flexible support to meet operational needs, equipment uptime and long term performance

Maintenance & Technical Assistance

Maintenance of assets is critical to achieving reliability of electricity supply and compliance with regulations. Lack of maintenance on the other hand can lead to loss of profitability, suboptimal use of new technology, absence of benefits from the installed base and deterioration or even severe incidents. Our experts are available to provide you with support on our solutions and supplement the efforts of your engineers and administrators.

To protect your valuable assets and to ensure trouble-free operations, a long-term agreement would ensure continuous performance, reliability and stability of your electrical network throughout its lifetime. This could be supplemented by a service level agreement (SLA) with specified response times. Substation automation system and product support can include:

- Preventive and periodic routine onsite maintenance
- Corrective maintenance (software and hardware)
- Long-term maintenance:
 - Multi-year maintenance with system updates and upgrades
 - Flexible maintenance plan
- 24/7 support service on critical issues and site attendance
- Maintenance and operations on legacy equipment
- Package of hours available at your discretion for consulting (electrical network studies) or training or other additional services

Grid Solution's regional sales delivery support units (SDSU), spread across the globe, take care of your needs and deliver projects and services. Highly qualified engineers are available to provide training and counsel you on design applications for protection schemes and digital control systems.

Our technical staff boasts a broad level of expertise and provides high-quality maintenance taking into account operational constraints.



Maintenance allows return on investment (ROI) optimization and return on capital employed (ROCE) improvement

Modernization & Retrofit

Grid Solutions refurbishment experts support the decision-making process to provide the most cost-effective solution for your renovation, modernization or extension projects. Depending on each particular situation, Grid Solutions offers the most adequate solutions for efficient management of substation protection infrastructure.

Our technical strengths include efficient project management, timely response, global capabilities and local presence. Backed by extensive experience as well as high product quality and based on your strategy, Grid Solutions builds customized migration paths with operational milestones that are adapted to your constraints.

Furthermore, refurbishment solutions tailored to your requirements can be proposed to protect your investment. Integrated refurbishment experts address applications in generation, transmission, distribution and industry, aimed at:

- Optimization of reliability and performance
- Adaptation of equipment to current needs and technology advances
- New norms and substation standardization
- Safety conditions
- Product and system obsolescence management

Cost constraints and technical factors have a major influence in these business decisions. Grid Automation, with a long history in this field and legacy substations knowledge, will advise its customers to reach the maximum of benefits of their investments with minimum of operational risks.



Once replacement of equipment identified, various options are available:

- Plug & play kits
- Panel door or rack replacement
- Extension of existing installations
- Complete scheme replacement
- Protection system replacement
- Control system replacement
- Protection Relay component



Modernization solution
with optimized implementation time
and reduced outage duration

Operation Field

Retrofit could be the most suitable economical solution in response to the following situations:

- Impaired safety conditions (staff safety and property protection)
- Reduction of equipment availability and reliability
- Non-compliance with standards
- Ageing equipment
- Lack of spares: unavailability or costly solutions
- Obsolescence
- Expert unavailability

Solutions

- Customized solutions for transformers, generators, transmission lines, motors and substation control systems
- Alignment of shutdown period with system requirements
- Comprehensive solutions from re-engineering through site commissioning
- Product life extension on a par with new technology with minimum investment



Repair Services & Spare Parts

Grid Solutions addresses customer needs in repair services and spare parts through its certified regional repair centers, providing fast and efficient solutions.

For advanced analysis and investigation requirements, customers benefit from the expertise of Grid Solutions' Automation centers of excellence, skilled in identifying faulty components and analyzing the fault causes. This could lead to the introduction of a preventive mode to avoid repeated defects.



We think about the most cost effective & efficient solutions to increase your substation automation equipment life span

Obsolescence Management, Upgrade & Migration

Without regular upgrading, the installation will show flat performance, be subject to operational risks due to ageing and have outdated functionalities. GE's Services enable customers to anticipate and plan milestones to prevent obsolescence, maintain system availability, improve performance and functionalities and preserve your investment with a long-term vision.

The main objective is to help customers finding preventive and curative solutions to:

- Reduce operating costs
- Extend lifetime equipment
- Ensure safety and security
- Optimize customers investment

Why?

- Legacy has become obsolete
- Be ready for extensions
- Protection relay migration
- New SCADA protocols

How?

- Step-by-step implementation philosophy
- Outage limitation
- Engineering & commissioning time time reduction

Legacy to DS Agile/RTU range

- Latest technology
- Reduce system failures
- Simplify maintenance
- Preserve customer investment

Smooth migration with limited outages

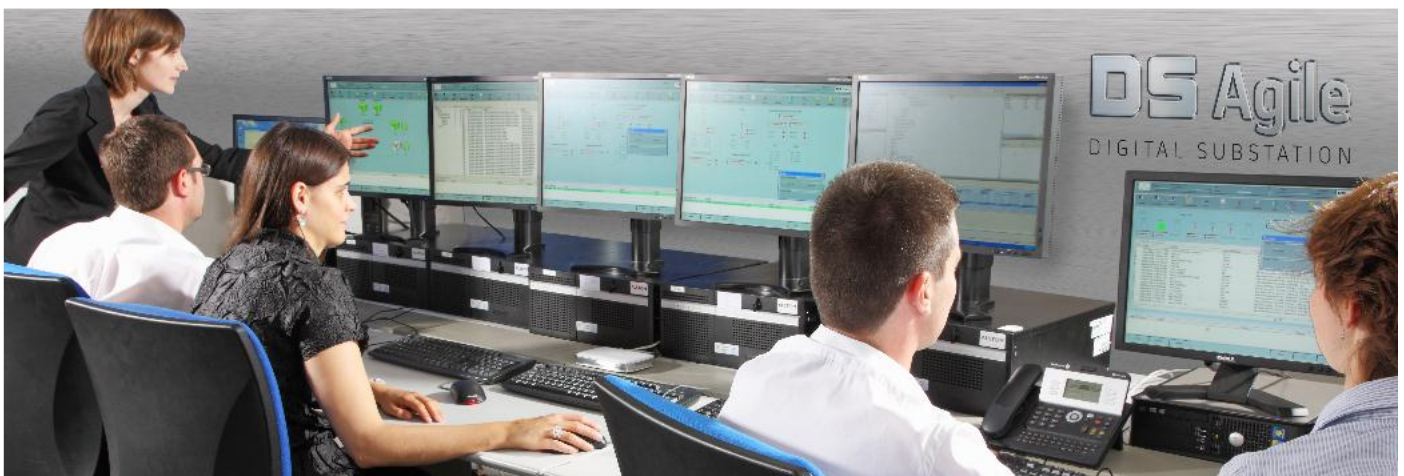
Migration towards a new technology allows for system stabilization and life-span extension

**Maintenance cost reduction
New technology benefits**

Migration efforts and benefits are spread over time.

New operational needs are combined with Grid Solutions technology roadmap to continuously deliver optimization and functionality enhancements.

Total cost of ownership is spread over the full life.



Don't let your assets become obsolete. Leverage Grid Solutions' support to reduce your total cost of ownership.

Commissioning & Testing

Grid Solutions provides a comprehensive range of services for the testing and commissioning of protection, BCU schemes and substation control systems for utilities, industries and offshore platforms. They include:

- Pre-commissioning test
- Scheme test
- Secondary injection test
- On-load test
- Bay controls, RTCC, synchronization test
- Testing & commissioning of protective relays, measurement centres, BCUs,
- End-to-end test

On completion of a site analysis, our highly skilled engineers provide detailed procedure to validate testing. In addition, the collected data can aid in future trend analysis.

Protection Engineering & Network Expertise

The protection engineering and consulting team offers unrivalled network expertise, enabling you to improve your electrical network quality. GE's team can advise you after an audit or incident analysis and propose solutions to improve network operability.

Network studies also include panel refurbishment and protection relay replacements, system upgrade, HMI modification, short circuit, calculation of settings and selectivity studies, RTDS and tailored trainings...

Extension

Global demand for electricity will continue to rise steeply, so that new interconnections, busbar increases, additional feeders or transformers in substations will all require additional, integrated protection and control systems resizing. Grid Solutions can support you in your expansion projects by proposing tailored solutions to preserve network stability and reliability.

Extension projects can embrace conventional control systems and digital control systems, even in legacy phases. Starting from PSCN 3020 and SPACE 2000 through to PACiS upto version 4.6, GE offers compatible solutions to limit outages and manage legacy equipment. For this purpose, GE highly recommends systems upgrades to the latest versions still supported by R&D. This is aimed at extending the installation's life span and spreading efforts and benefits over time.



Maximize your electrical network availability

Technical Trainings

Grid Solutions' Automation Training Centers are recognized for the quality of their education. They offer a full range of training in operation and maintenance of power equipment, protection and control. To fit your needs, standard and customized courses are delivered, with a broad portfolio adapted to trainee levels and roles.

Training Contents

Power Protection Systems - Fundamental & Detailed Courses:

- Utility transmission power system protection
- Motor and transformer protection
- Line and cable protection
- Power network stability

Protection & Control

- MiCOM range (P34x, P44x, P74x, etc.), Multilin UR, 8 Series, F650
- Legacy products
- Configuration and application on IEC 61850
- Communication protocol

Substation Control Systems

- Digital Control Systems and RTU
- Architecture, operation, maintenance and basic configuration
- Configuration, operation and maintenance

IEDs

- MiCOM Px40 Agile operation
- Legacy products

Monitoring and Diagnostics

- SGD: Intellix GLA, Hydran
- MGD: Transfix DGA, Kelman

Download the training catalogue:

<http://www.gegridsolutions.com/AlstomEnergy/grid/products-services/product-catalogue/electrical-grid-new/services/technical-training/index.html>

A better understanding of your equipment and the technology involved allows everyone to make the right decisions at the right time. Grid Solutions' Automation training centers provides solutions based on customer needs to improve staff skills:

- Training on power system protection fundamentals
- Product training as per customer requirements
- Annual calendar with scheduled courses
- Customized courses at customer premises



Enhance your staff capabilities & knowledge

For more information please contact
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