



# DS Agile v6.1

## Featuring DS Agile aView™, the next-generation user interface for substation automation

As power networks become more efficient and intelligent, substation automation systems need to provide new and smarter solutions. The DS Agile v6.1 Digital Control System incorporates a brand new, state-of-the-art graphical user interface that help users optimally monitor, control, operate and maintain modern electrical substations.

### Full Situational Awareness

The new generation of DS Agile incorporates a new, state-of-the-art user interface that provides holistic and accurate monitoring of the substation for its optimal control, operation and maintenance.

Any type of electrical and non-electrical parameters are acquired by using sensors and condition monitoring IEDs across the substation, integrated in the DS Agile database and displayed in the universal interface through fully customizable graphical interface:

- Electrical topology and measurements
- Primary equipment and secondary devices condition data
- Indoor & outdoor environmental conditions
- Auxiliary services state
- Substation infrastructure information

### Success Guaranteed

GE provides a complete portfolio of software and hardware solutions for substation automation, which are pre-tested & validated for their successful integration to the DS Agile system. Third-party devices can also be easily integrated in the architecture, IED's that do not support PRP (Parallel Redundancy Protocol) or HSR (High availability Seamless Redundancy) can be integrated into the substation network using GE's Redbox.

### Project Delivery and Support

GE has experienced teams located worldwide, with a proven track-record in project management, engineering, support, maintenance and training. Our experts can provide assistance in any of these areas, allowing end users to get the maximum from DS Agile.

## Key Benefits

- Powerful, user-friendly and fully customizable HMI
- Total situational awareness
- Hardware performance adaptable per specific needs
- IEC 61850 inter-operability
- High level of standardization
- Reliable redundant architectures
- Wide-area automation
- Secure Web access to HMI
- Global teams for project delivery and support



## DS AGILE aView: Universal Graphical Interface

Aimed at releasing the potential of digital technologies while facilitating adequate situational awareness of the substation, today's Digital Control Systems (DCS) are required to integrate all kinds of digitized data acquired across the whole substation. More importantly, they can display large amounts of information in a clear, smart manner through customized views, dashboards and applications specific to the different users.

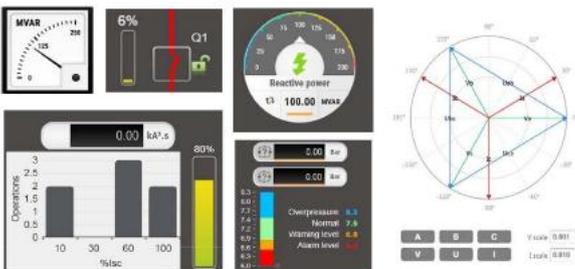
DS Agile aView is the optimized universal Human-Machine Interface (HMI) that enables the management of the multiple control, measuring and monitoring information from the substation, making the DS Agile the ideal solution for responding to the demanding challenges of substation owners and operators.

### Main Substation HMI Functions

- Single-line dynamic diagram viewer: voltage & bay level
- Operation and monitoring of switchgears and transformers
- Alarm & event list viewing and reporting
- Substation troubleshooting, disturbance analysis
- Data monitoring, logging, archiving and trend viewer
- Monitoring of primary and secondary devices
- Integrated online condition monitoring dashboards
- Handle full substation perimeter data not only primary devices

### Enhanced Graphics Capabilities

- Zooming
- Panning
- Decluttering
- Vectorial objects
- Advanced curve drawing
- Flexible integration of widgets



### Smart Engineering Functionalities

- Large library of electrical symbols and components
- The mimic behaviour can be configured and tested offline, independent of the field devices
- Multi-language HMI with online switching capability
- Easy and fast installation saving man hours

# DS Agile aView

### Operation Improvement

#### Advanced Alarm & Event Management

- Alarm lists accessible from any substation level
- Real-time and historic alarms / event lists available
- Alarm management: inhibition, on/off monitoring
- Synthesis of alarm groups

#### Full Substation Situational Awareness

- Holistic view: monitoring of the complete substation through one common, universal interface
- Synthetic, visual information of substation state and health
- Intuitive and fast data access in the system database

#### Easy and Secure Operation Tasks

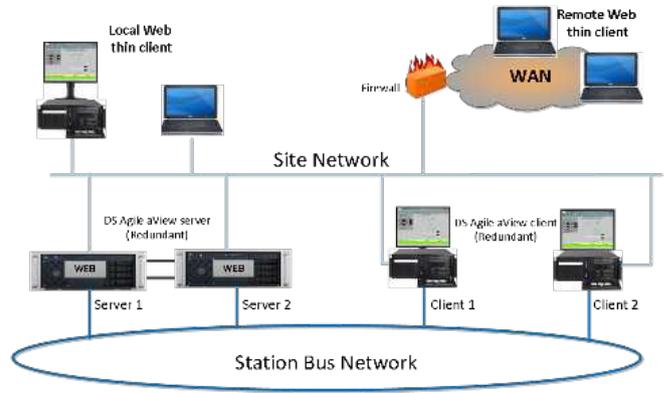
- Improved control pop-ups (e.g., Select-Before-Operate)
- Intervention tags (normal / test / locked) can be placed at any level: substation, voltage level or bay
- HMI desktop environment and filters saved per user

#### Remote Access & Control

- Remote access to substation with maintenance / operation interface
- Web access secured through substation's firewall
- Up to 5 Web clients
- Different user access rights depending on local or remote connection

## High-Performance Workstation Hardware

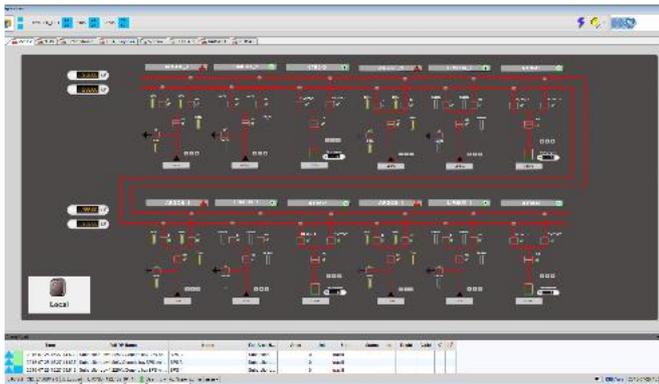
- Powerful graphics capabilities for the high resolution screens
- Able to manage up to 50,000 data points
- Supports up to 4 high-resolution screens
- High storage capacity embedded for mid & long term archiving
- Can be supplied with IEC 62439-3 PRP / HSR interface
- Optional solutions with separate client & server PCs or "all-in-one", cost-effective integration
- Hot stand-by redundancy



DS Agile aView redundant server and client HMI workstations in a network providing local and remote (Web) access

## HMI Views and Application Examples

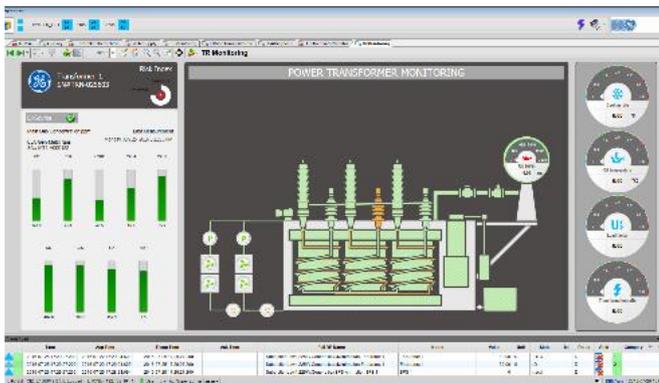
### Single-line Diagram With Alarm List



### Measurement Dashboards



### Condition Monitoring of Transformer



### "Bird's Eye View" Substation Situational Awareness



## DS Agile v6.1 Functions

### Data Concentration and Processing

One of the essential functions of the DS Agile is to concentrate and process data, based on the information that comes from a variety of sources, both analog and digital. For example, when integrating legacy equipment, analog data can be acquired directly from current and voltage transformers while digital data can be acquired over serial communications links or via hardwired links.

DS Agile manages many types of data from the substation's primary and secondary equipment such as: transformer tap changer and switchgear positions, control signals, measurement values, disturbance records, settings, etc. Each item of qualified data is uniquely referenced in the system configuration tool in order to ensure full consistency of the information, as well as allowing it to be re-used in other parts of the system.

### Monitoring and Diagnostics

Among the numerous DS Agile standard features, diverse functions for local or remote monitoring and analysis of collected data are available. Key situational information can be obtained either from the embedded LCD screens of the C264 bay controller or other monitoring devices, or, at substation level, through the powerful graphical user interface DS Agile aView, which provides more sophisticated and clear monitoring views. The user can then benefit from customized displays for easier awareness and maintenance, comprehensive alarm annunciator screens, accurate fault location, etc. Other typical features include advanced reporting, dual-language display and disturbance record analysis.

DS Agile system capabilities

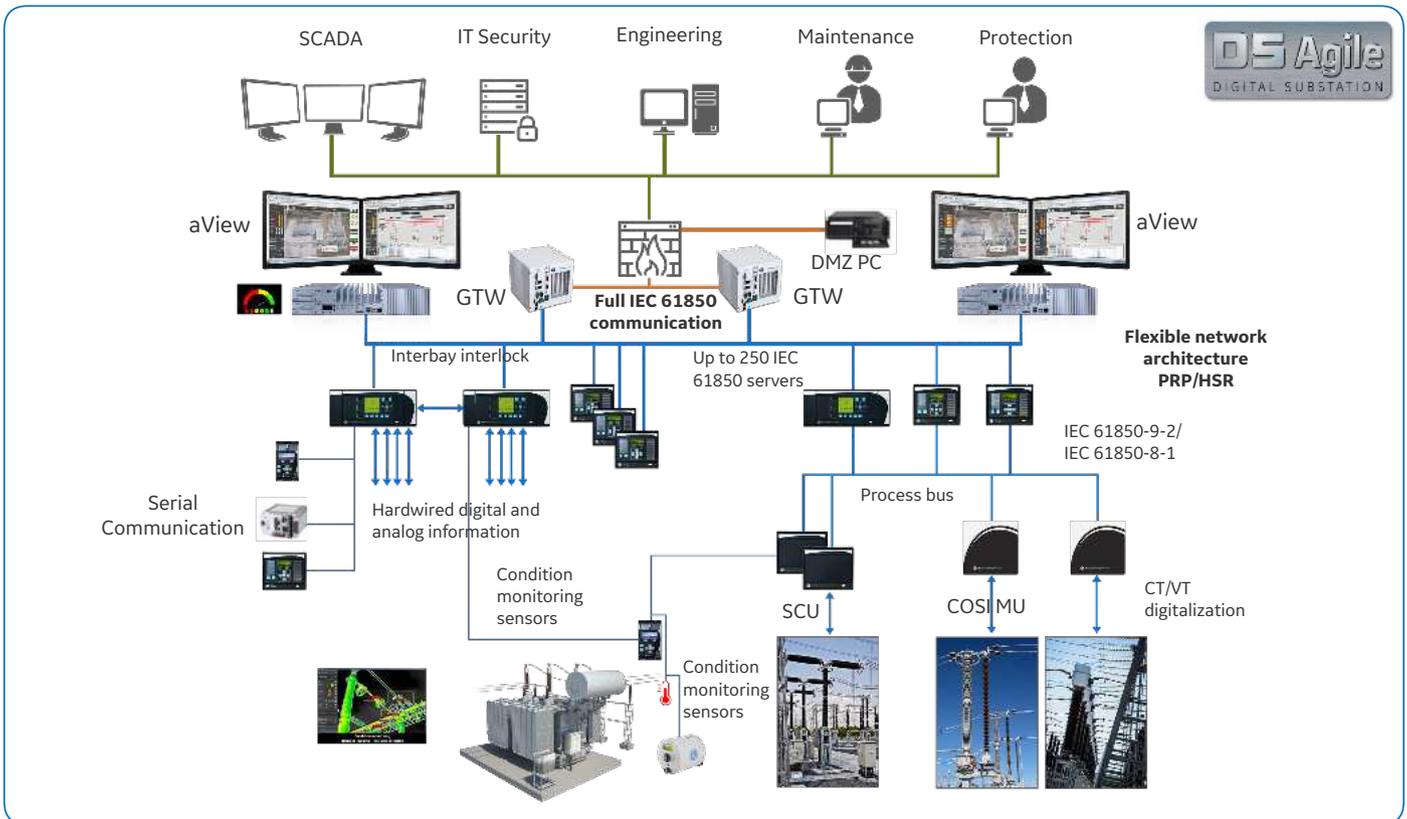
### Control

Once a control operation is initiated by an operator, locally or remotely, multiple checks are performed by the system before the effective issue of the control order or signal, in order to make it fully secure. For instance, interlocks are ensured by logical equations or as the result of a dynamic topological analysis coupled with expert rules. Interlocks are managed as close to the process as possible to provide the best security of operation. Interlocking conditions are graphically displayed on the operator's screen in order to immediately identify the locking conditions, if any, allowing the operator to make the appropriate changes before issuing the order.

### Automation

The operator can configure specific control sequences or automation schemes, across one or more sites (e.g. automatic re-closing, System Integrity Protection Schemes (SIPS), synchro-check). Such applications can work based on local or remote data. Similarly, the outputs can perform local or remote actions. Programmable logics can be implemented using either Programmable-Scheme Logic (PSL) or Programmable-Logic Controller (PLC) methods. PSL is used for fast automation applications and it is available within the C264 bay controller. Since PSL is event-driven, there is no cycle time. The optional PLC tool is fully compliant with IEC 61131-3 and it can be used for complex or sequential automation applications.

DS Agile v6.1 provides additional inbuilt libraries of automation functions, including functions for feeder protection, automatic reclosing and voltage regulation of parallel transformers.



### Redundant Architectures

The DS Agile system architecture is built around an Ethernet network that links the different components from the base architecture with the HMI workstation, gateway and protection and control IEDs.

The Ethernet network may be local to a substation -typically for a transmission application- or it can interconnect dispersed sites commonly found in industrial or infrastructure applications.

The Client-Server communications exchange avoids any central point between local and remote control and allows for tailored redundancy of the client and/or server.

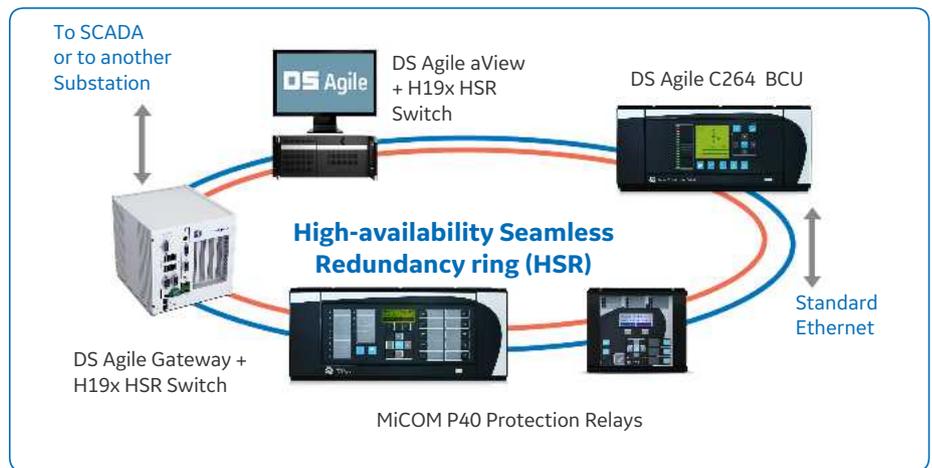
Complete architectures are also typically implemented as a way to make an existing installation evolve progressively via new technologies. The older system then becomes a slave to an IEC 61850 converter and new devices can successively be plugged into this network.

### Communications Protocols

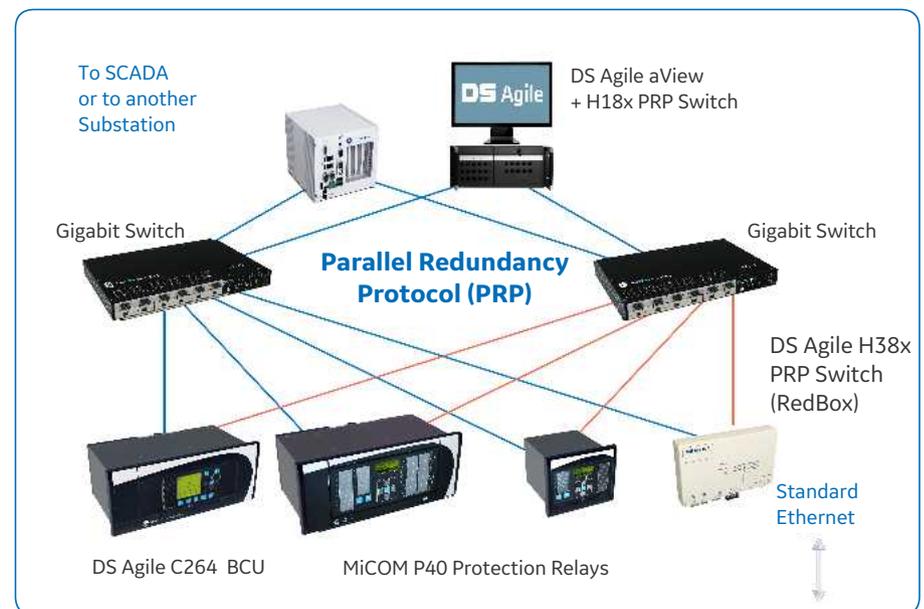
Physical communications between components are based on both Ethernet and/or serial links in order to cope with different applications such as the reuse of existing devices and the integration of third-party equipment.

DS Agile v6.1 supports most extended serial protocols (T103-T101, DNP3, and MODBUS) in order to interface with existing devices and it can be fully integrated within a remote control scheme. When using MiCOM & Agile devices, the same link can be used to retrieve settings or disturbance records. Communications with remote grid control centers are also possible through IEC 60870-5-101, IEC 60870-5-104, DNP3, OPC or other older protocols on demand.

State of the art communications technology based on client-server and peer-to-peer links such as IEC 61850 is standard across the whole architecture of the DS Agile system. It relies on fast Ethernet networks and offers new perspectives in terms of distributed functions, performance and flexibility. The DS Agile also enables innovative automation schemes and the flexible addition of new application clients.



IEC 62439-3-5 HSR ring, Ethernet-based architecture



IEC 62439-3-4 PRP dual star, Ethernet-based architecture

## DS Agile v6.1 Components

A typical DS Agile solution integrates many Intelligent Electronic Devices (IEDs) such as protection relays, measurement centers, bay controllers, etc. In addition to those supplied by GE, DS Agile is fully open to the integration of third-party devices so that existing devices in the field and user preferences can be accommodated.

When third-party devices are integrated, strict tests are realized in order to validate functional interoperability limits, data retrieval, control capabilities and remote settings.

### DS Agile C264 Bay Control Unit (BCU)

The C264 bay controller is a sophisticated modular computer that supports many applications and functions for substation control, communications, monitoring, protection and automation.

Typical C264 applications include:

- Bay control
- Remote Terminal Unit (RTU)
- IED gateway / Data concentrator
- Automation - PLC & PSL
- Sequence-of-events recorder (SOE)
- Measurement center
- Power quality monitoring
- Integrated feeder protection
- Automatic voltage regulation
- Synchro-check



DS Agile C264 substation / bay controller

## Condition Monitoring

Online condition monitoring functions are essential for the correct life cycle management of switchgear and power transformers of the substation.

A wide range of state-of-the-art sensors and IEDs for online data acquisition can be integrated within the DS Agile system through IEC 61850 or other standard communications protocols to provide valuable, real-time condition data for failure prevention and optimal asset management.

Complementing the DS Agile system, GE also offers specific expert solutions for online condition monitoring of primary equipment, such as the well-proven MS 3000 for power transformers and GISWatch for gas-insulated switchgear, among others.



Transformer Monitoring and Diagnostic

## DS Agile Gateway

Combining full compliance with IEC 61850, hot-standby redundancy and ease of commissioning, the DS Agile Gateway offers a powerful solution for interfacing bay level devices to SCADA/EMS systems with a variety of standard communication protocols



DS Agile gateway

## Grid Solutions' Relays

GE provides the most complete family of protective relays for transmission, sub-transmission, generation and industrial substations.



MiCOM P40 protection relay



Multilin UR protection and control family

Typical protection applications include:

- Busbar
- Transformer differential
- Line differential
- Distance
- Generator
- Motor
- Feeder
- Phasor measurement
- System integrity protection schemes

## Grid Solutions' Reason Measuring and Recording IEDs

GE's Reason IEDs can be integrated in DS Agile V6.1 for fast, highly accurate, real-time fault recording and analysis, power quality measurements and trend recording - ideal for analysing network faults, reactions of protection IEDs, dynamic network stability and long-term trends.



Reason DR60 Digital Recorder & Synchrophasor Measurement Unit

## GE's Switches

GE's H-series Ethernet switches use a combination of advanced redundancy protocols and fiber-optic connections to ensure reliability and availability of substation communications networks.

All this, while maintaining the flexibility of being able to connect to standard Ethernet networks and thus ideal for substation refurbishment or upgrades.

All H-series switches are available as standalone, embedded and PCI card (for integration into a PC) versions.

GE's H-series range for DS Agile also include Parallel Redundancy Protocol (PRP) "RedBox" switches.

Reason H49, GE's all in one gigabit redundancy solution, has been especially designed for the digital substation, for use on the substation bus and process bus, in a mix of PRP dual star and HSR rings. The 1000 Mbps HSR ring allows to transport multiple Sampled Value streams on the same ring, simplifying network topology. In addition, IEEE 1588v2 and Power Profile compliance allow for high precision timing application such sampled value timestamping.



Reason H49 All in one gigabit redundancy solution

