Grid Solutions

GridBeats™ APS

Automation and Protection System

GridBeats™ APS represents a new approach to protection and control devices for transmission, primary distribution, generation and large industrial applications. It supports standard P&C schemes like conventional (copper wiring), digital (with and without process bus), centralized protection and control, and enables Virtual Protection Relays (VPR). GridBeats™ APS builds on the proven digital technology and algorithms of the renowned UR (Universal Relay) and MiCOM Agile platforms ensuring the highest levels of security, selectivity, performance, adaptability and dependability. GridBeats™ APS redefines the management of P&C devices by introducing GE Vernova-patented functionalities such as **Hardware Abstraction** (unbundling hardware from application) and **Independent Firmware** (separating core P&C from Platform firmware). These technologies streamline management with greater flexibility enabling significant cost savings. An intuitive IED configuration tool (ICT) completes the package making GridBeats™ APS ideal to combat cybersecurity threats, help with aging infrastructure and capacity expansion, and ease operational complexity. In other words, it helps customers tackle the P&C challenges of the digital age.

GridBeats™ APS can protect a wide range of power assets from MV to EHV on a single device. This ranges from generation all the way to line differential and distance, including Digital Fault recorder (DFR) applications responding to conventional, digital, and centralized protection and control (CPC) applications.

27 P&C packages plus 26 support and M&D packages will be available for all main P&C applications. The packages can be used one at a time to protect a specific asset, or they can be combined to protect multiple assets (Hardware Abstraction). Similarly, packages for Centralized Protection and Control (CPC) schemes are also supported. Dedicated P&C and platform firmware (FW)versions can be independently updated to prevent revalidation of P&C schemes due to cybersecurity patching or communication upgrades (independent FW management).

Key Benefits

- Hardware Abstraction: Instead of application specific devices, GridBeats™ APS works on a software modular platform where users choose the P&C package needed at the time of purchase and/or afterwards. This simplifies procurement, saves time and helps manage the need for spare and lab/revalidation devices.
- Independent FW Management: Enables independent platform (comms, cybersecurity, etc.) firmware updates without affecting the P&C algorithms and logic. This removes the need of revalidation of P&C schemes when cybersecurity patches are needed.
- Centralized protection and control: A single GridBeats™ APS device with CPC package can potentially replace all P&C devices in a substation (Transformer, Feeder, Bus, etc.), which significantly reduces the number of devices, panels and deployment time.
- Fault Analysis: DFR requirements for sampling rate and memory are met through accurate fault analysis with fault reports, events and disturbance records.
- Easy Retrofit: Easy retrofit of UR relays with the same form factor and terminal blocks allow existing UR users to upgrade to the latest platform at a fraction of the cost. Upcoming releases include compact form factor 40TE and P40 MiCOM retrofit.

GE VERNOVA

Protection and Control

- Provides P&C solution for one or multiple assets, or a complete substation
- Fast, segregated MV, HV and EHV protection algorithms
- Supports both 4.8, 14.4kHz as per IEC61869 and 15.36 kHz sampling rates
- DFR package with extended recorder memory
- AC inputs compliant to IEC 61869-13

Advanced Communications

- Up to six independent Ethernet ports for simultaneous and dedicated network connections supporting hot-standby, PRP and HSR redundancy, with 100 or 1Gbps availability
- IEC61850 Ed.2.1, IEC 61850-9-2LE and IEC 61869 process bus compatibility

CyberSecurity

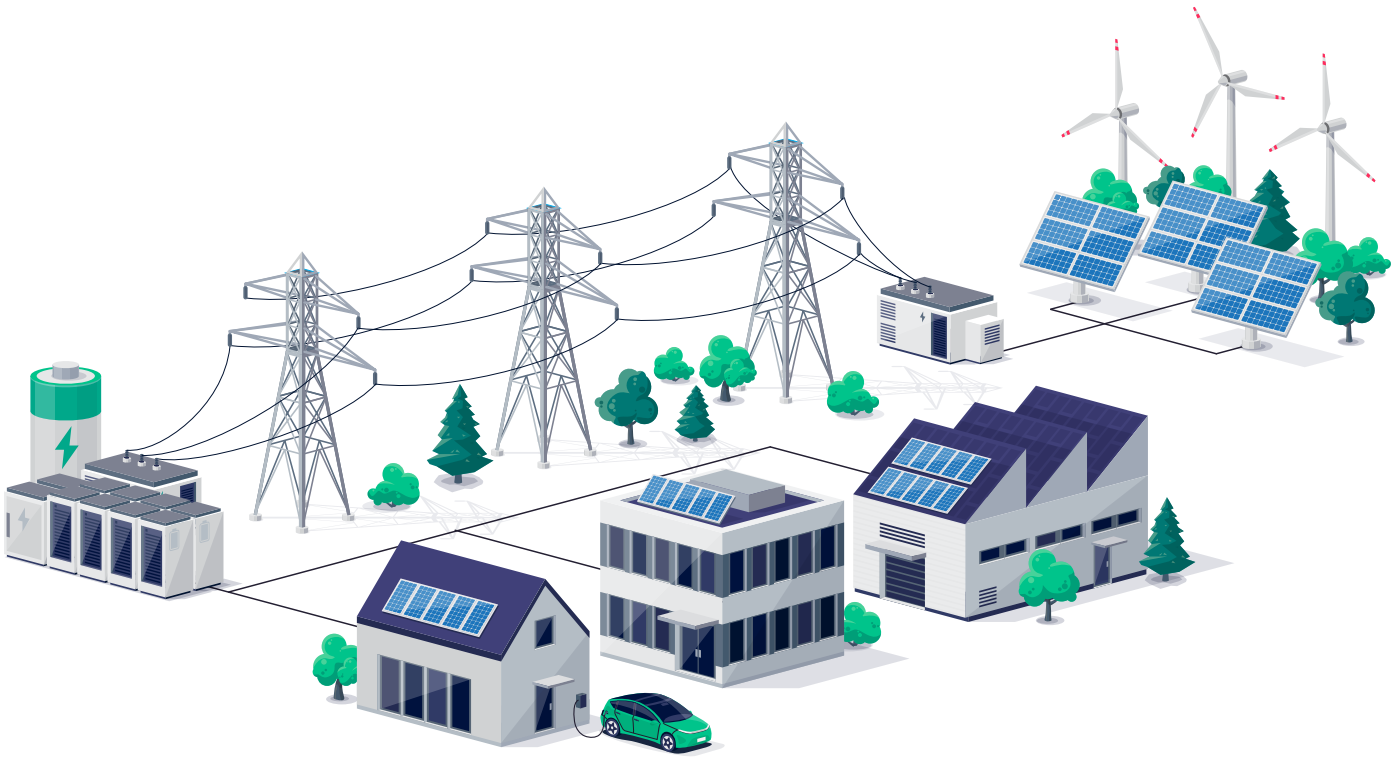
- Meets the latest cybersecurity standards and regulations: IEEE 1686, IEC 62443, IEC62351, NERC-CIP
- Security features aligned to IEC62443 security level SL2, SL3 and SL4

Monitoring and Metering

- DFR package with advanced recording capabilities and extended memory, configurable waveform capture, data logger, fault reports and SOEs
- Fault records available per individual package (power asset/bay) or for full substations
- M&D packages for breakers, transformers, motor condition monitoring and power quality
- Measures all electrical parameters such as: current, voltage, sequence components, power, energy, power factor, frequency, harmonics, demand, phasors, etc.

Applications

- The GridBeats™ APS Platform supports all main P&C applications, 27 P&C Packages covering generators, transformers, busbar, transmission line (distance and differential), multi-terminal line differential, feeders, bay and other controllers, network stability capacitor banks, motor and DFR applications.
- Other packages enable communications, cybersecurity levels and power asset monitoring and diagnostics for breakers, transformers, motors and power quality.
- Digital substations are a natural fit for GridBeats™ APS devices. They deliver multiple options on a number of ports, network architectures (redundancy), bandwidths and supports both IEC 61850-9-2LE, IEC 61869 and IEC 61850 Ed 2.1. Additionally, cybersecurity is fully based on IEC62443 and IEC62351.
- Designed to meet the challenges of Centralized Protection and Control (CPC) schemes.
- Utility substation and industrial plant automation.



Feeder Package

Advanced Feeder Protection, featuring incipient fault detection, pilot schemes, wattmetric ground fault protection, and load encroachment, is designed for sub-transmission and primary distribution systems — whether conventional or digital. The Advanced Feeder package delivers comprehensive feeder protection, control, advanced communications, monitoring, and metering in an integrated, compact solution

The basic feeder package provides cost effective and basic feeder capabilities, that can be grouped to protect several feeders.

DFR Package

Centralized, single-box or distributed digital fault recorder (DFR) options are available in a full 19-inch rack or a smaller half rack form factor.

Intended for recording electrical events in systems of any voltage level, as a central unit it can use AC inputs and multiple types of I/O module when in a conventional scheme. It can also use sample values (SV) and GOOSE messages when in a digital scheme. GridBeats™ APS Platform can connect to peripheral units (RA331, 332 and 333) and become part of a distributed scheme.

Platform Package

This package provides a complimentary set of functionalities that comes with any P&C or DFR package.

The platform package provides the elements required to configure the physical device and extend the application capabilities, such as Flexlogic, contact I/O, trip bus, etc.

Fully Modular Design

Grid**Beats**™ APS

The GridBeats™ APS is a family of hardware and software products that redefine management of protection and control devices.

Through hardware abstraction and independent firmware, GridBeats™ APS delivers unmatched flexibility when managing devices and removes unnecessary rework end-users are forced to do when upgrading firmware of existing devices. Independent firmware also enables remote firmware upgrade and patching of communication, cybersecurity and other platform services.

The GridBeats™ APS devices build on a fully modular design that allows users to individually replace specific hardware components when needed, which drastically reduces downtime when having to upgrade, retrofit or repair.

The GridBeats™ APS will be available in two form factors, 80TE (19" rack) and 40TE, and will provide multiple front panel options: Graphical front panel, standard front panel and LED front panel.

The GridBeats™ APS is designed to meet the latest communication, application and cybersecurity requirements as well as compliance to standards needed to fit existing and new Protection and Control schemes.

Device Hardware

The GridBeats™ APS devices are fully modular, allowing easy customization of inputs and outputs, minimum stock of spare parts and reduced downtime when having to upgrade, retrofit or fix due to a contingency (e.g. Failed trip/close coil that burned a contact output).

The chassis of the device supports 10 slots for different types of modules in the 80TE form factor. Rear terminal blocks could be pin or ring terminal or fiber depending on the module variant.

Types of modules supported:

CPU Module

The capabilities within the GridBeats™ APS require a powerful multicore processor with dedicated cybersecurity Trusted Platform Module (TPM) and flexible communication interfaces.

The GridBeats™ APS CPU module supports multiple combinations of communication interfaces including 2/4/6 Ethernet ports, Optional serial copper ports and Inter Relay Communications (IRC) and optional extended memory for the DFR package.

Power Supply Module

Responsible for powering up the GridBeats™ APS devices, this module is designed for increased reliability by reducing the number of components and removing the need for electrolytic capacitors and batteries.

The module comes in two ranges (high and low) that fit voltage levels from 24Vdc to 300Vdc or 88 to 265Vac. An optional redundant power supply is available for customers when required.

AC Modules

Current and voltage inputs have been designed in alignment with IEC61869-13 which standardize nominal values of the analog inputs and their performance during fault conditions.

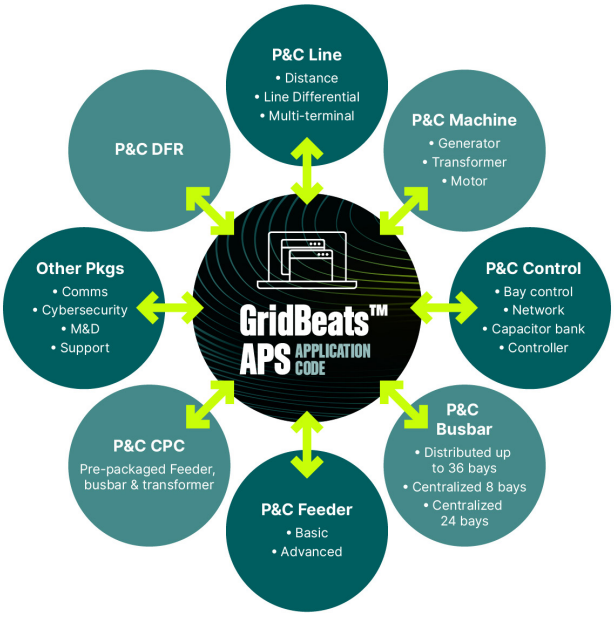
AC modules come in different variants including 4 voltages plus 4 currents, 8 currents, 8 voltages, 7 currents plus 1 voltage, with optional sensitive current.

GridBeats™ APS supports up to three AC modules in one device, which delivers 24 AC channels that fit eight 3-phase systems or six 3-phase with a ground input per system. Other configurations are also possible when combining current and voltage inputs.

Contact I/O Module

8 out of the 10 slots in the GridBeats™ APS support contact I/O modules. There are several I/O variants available allowing a multitude of I/O configurations to suit the most demanding applications. Up to 210 contact inputs, 126 contact outputs or a mix of them are supported when using the 80TE chassis.

Different types of outputs are also available: trip rated form-A, form-A with coil monitor, form C, mechanically latched relays, solid state relay, Form-C and mechanically latched relays for normal outputs. On the contact inputs side, multiple types are also available: grouped 5/4/2 and independent, with or without battery bank voltage monitoringand independent, with or without battery bank voltage monitor.



Transducer Module

RTD inputs and DCmA inputs/outputs are available to monitor equipment parameters such as temperature and pressure.

GridBeats™ APS supports up to six of these modules in one device, fitting generator and power transformer applications that demand a large number of RTD inputs.

Inter Relay Communication Module

This type of module enables sharing of digital status and analog values between devices for control, fast tripping or teleprotection applications usually associated to line protection schemes.

Process Bus Extension Module (PBEM) and RAU Module

Although the CPU module supports 61850-9-2LE and IEC61869 process bus SV, the PBEM module provides an extended number of ports to enable a point- to-point architecture required by certain P&C schemes, such as distributed busbar differential protection or distributed DFR schemes.

Scalable Hardware

The modular design of the GridBeats™ APS devices allows upgrades through additional modules to meet the evolving needs of the associated P&C scheme. Additional I/O, or AC, or other modules can be installed in the device's available slots to support future expansions of the P&C system.

Besides expanding, other types of hardware upgrades are possible, such as replacing the type of front panel or type of Inter-relay communications module, etc.

Hardware Code

The Hardware code is the CORTEC that defines the hardware components of the GridBeats™ APS device: Type and/or quantity of chassis, front panel, power supply, CPU, AC, I/O and other modules. Order code structure is available in the following sections of this brochure.

Application Code

Application code is the CORTEC that customers use to define the functionality needed within the GridBeats™ APS device.

Application codes are made by putting packages together. Communications, cybersecurity, P&C, Support and M&D are the available types of packages.

Application codes are licensed and managed through a license management system. This licensing model provides greater flexibility, allowing application codes to be transferred between devices. Because the licenses are perpetual, they can be included as part of a project's CAPEX, helping to avoid increases in the O&M budget.

Despite the advantages of licensed application codes, customers have the option to use GridBeats™ APS devices without changing their existing management processes. They may use a single-line CORTEC that covers both the hardware and application, allowing them to continue managing P&C devices as they do today. At the same time, they retain the option to separate hardware and application management whenever they are ready.

Hardware Abstraction

GridBeats™ APS introduces users of P&C devices to the world of software-defined applications that run on a common device.

All GridBeats™ APS devices have a hardware component (Hardware Code) and an application component (Application code), and both are needed for the solution to work.

This separation allows customers to manage hardware independently from applications, delivering greater flexibility and benefits across multiple scenarios: reduced bill of materials (BOM) and spare parts for P&C devices, faster project execution as customers can purchase hardware ahead of project design, and intuitive application packages that reduce effort required for selection.

Hardware abstraction also enables customers to keep core P&C algorithms intact during future migrations to new CPUs or different platforms, such as virtual protection relays.

Another benefit of hardware abstraction is enabling multi-asset protection where a single device can protect more than one power asset when required, e.g. Two-power transformers, a hybrid line with two differential zones, or a line and transformer differential element with independent zones, etc. This can reduce the number of devices and the physical footprint required for protection and automation schemes by up to 80%.

Independent Firmware (FW) Management

Optimizing Operations & Maintenance (O&M) budgets remains a continuous priority for most organizations. For this reason, reducing the effort required to manage FW in P&C devices was a key use case that shaped the design of GridBeats™ APS.

For decades, users of digital P&C devices have invested significant resources in FW revalidation whenever upgrades are required. Traditionally, P&C device vendors provide a single FW file per device, which forces full functional testing during validation and after each upgrade—regardless of the scope of changes introduced in the new FW. The effort involved can be so substantial that some

users seek workarounds to avoid FW upgrades altogether.

To reduce the time spent on FW validation and testing, GridBeats™ APS is built on two firmware layers: one dedicated to core P&C functions and another for platform level functionality.

This separation eliminates the need to retest P&C functionality when changes to FW are disconnected from the P&C functions. As a result, operators can achieve up to 54% less effort for FW validation and up to 74% less effort for device testing following an FW upgrade.

FW Control

Each FW file for the P&C and Platform has its own control numbers consisting of 4 digits.

The platform FW can be upgraded independently from the P&C FW, which allow users to address numerous issues without having to touch and retest the P&C functions.

One of the strongest use cases for the independent FW architecture is upgrading FW to address cybersecurity issues.

Cybersecurity issues are often identified by third parties testing devices with current and legacy firmware using advanced tools and techniques, making it difficult to predict what issues may be uncovered.

Having independent P&C and Platform FW allow users to only upgrade the platform if a cybersecurity issue is identified, avoiding the effort related to validating and testing the P&C functionality. This delivers a positive impact on O&M budgets and total cost of ownership.

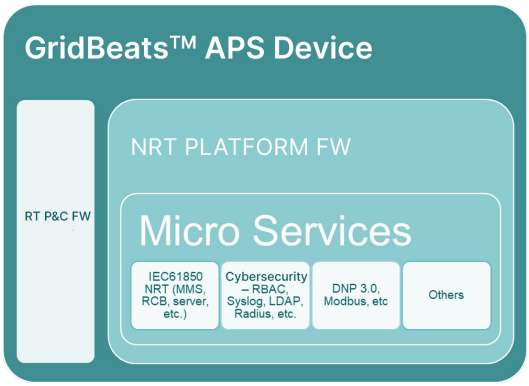
Patching

Along with independent P&C and Platform firmware versions, GridBeats™ APS devices also support patching of microservices within the platform firmware.

Patching allows for a fast response to issues that maybe identified during the factory or site acceptance tests. Releasing a patch may take several weeks, which is much faster than the several months needed to release a firmware version. In addition to enabling faster releases, patching also reduces the amount of testing required after application, since patches affect only specific micro services.

Finally, most patches can be applied without rebooting the device, preventing it from being taken out of service.

Faster response, targeted testing and no reboot requirements make patching a powerful feature that simplifies FW management of P&C devices.



Platform Package

The Platform package provides all the elements required to configure the physical device and extend the application capabilities, such as Real Time Clock (RTC), display/LEDs properties, contact inputs/outputs, languages, etc

Advanced Automation

GridBeats™ APS incorporates advanced automation features including powerful FlexLogic programmable logic, communication, and SCADA capabilities that far surpass what is found in the average protection relay. Each GridBeats™ APS device can be seamlessly integrated with other relays using standard services for complete system protection and control.

FlexLogic

FlexLogic is a powerful programming logic engine that provides the ability to create customized protection and control schemes, lowering the requirement of having auxiliary components and wiring. With minimum 1512 lines of FlexLogic, the GridBeats™ APS can be programmed to provide the required tripping logic along with custom scheme for breaker control (including interlocking with external synchronizers), transfer tripping schemes for remote breakers, dynamic setting group changes and most custom schemes.

Trip Bus

The trip bus element allows aggregating outputs of protection and control elements without using FlexLogic and assigning them in a simple and effective manner. Each trip bus can be assigned for either trip or alarm actions. Simple trip conditioning such as latch, delay, and seal-in delay are available.

Direct I/O Messaging

Direct I/O allows for the sharing of high-speed digital information between multiple GridBeats™ APS devices via direct back-to-back connections or multiplexed through a standard Digital Signal Level 0 (DS0) multiplexer channel bank. Regardless of the connection method, direct I/O provides continuous real-time channel monitoring that supplies diagnostics information on the channel health.

Direct I/O provides device-to-device communications that can be used in advanced interlocking, generation rejection and many other special protection schemes.

- Communication with GridBeatsTM APS devices in single or redundant rings rather than strictly limited to simplistic point-to point configurations between two devices.
- Connect to standard DS0 multiplexer through standard IEEE C37.94 interfaces or via direct fiber optic connections.
- No external or handheld tester required to provide channel diagnostic information.
- No external or handheld tester required to provide channel. diagnostic information.

Multi-Language

GridBeats™ APS devices support multiple languages: English, French, Russian, Chinese, Turkish, German, Polish and Japanese. These language options are available on the front panel, in the EnerVista Flex 2.0 setup software, and in the product manuals.

Easily switch between English and an additional language on the local displays without uploading new firmware.

Monitoring and Metering

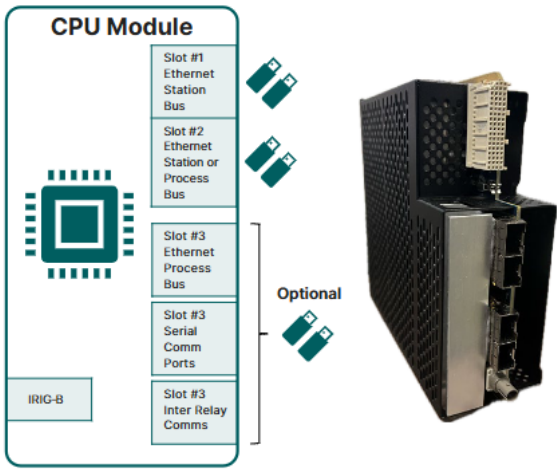
GridBeats™ APS includes high accuracy metering and recording for all AC signals. Voltage, current, and power metering are built into the relay as a standard feature. Current and voltage measurements are provided as total RMS magnitudes and as fundamental-frequency magnitudes and phase angles.

Fault and Disturbance Recording

The advanced disturbance and event recording features within the GridBeats™ APS can significantly reduce the time needed for fault analysis of power system events and the creation of regulatory reports. Recording functions include:

- Sequence of Event (SOE)
  - 50000-time stamped events (GridBeats™ APS Relays)
- Transient Fault Recorder (Oscillography)
  - Supports IEEE C37.111-1999/2013, IEC 60255-24 Ed 2.0 COMTRADE standard
  - 128 digital & up to 24 analog channels centralized solution or 128 channels with 8 distributed RA modules
  - Events with up to 60s length
- Disturbance Recording (Data Logger)
  - up to 1 sample/cycle per channel
- Fault Reports
  - Powerful summary report of pre-fault and fault values, plus fault location when applicable
- Extended memory: Up to 50GB for records

The very high sampling rate and large amounts of storage space available for data recording in the GridBeats™ APS allow the capturing of complex events and could eliminate the need to install costly stand-alone recording equipment.



Advanced Device Health Diagnostics

The GridBeats™ APS performs comprehensive device health diagnostic tests at startup and continuously during runtime to verify its major functions and critical hardware. These diagnostics monitor for conditions that could affect the security and availability of protection and report device status via SCADA communications and the front panel. Continuous monitoring and early detection of potential issues help improve system uptime.

- Comprehensive device health diagnostics performed at startup.
- Monitors the CT/VT input circuitry to validate the integrity of all signals.
- Monitors internal DC voltage levels that allows for proactive maintenance and increased uptime.

Communications

GridBeats™ APS provides advanced communications technologies for remote data and engineering access, making it easy and flexible to use and integrate into new and existing infrastructures.

Direct support for multiple Ethernet ports and up to 1GB bandwidth communications allows for low-latency controls and high-speed file transfers of data and files. The available redundancy options provide the means to create fault tolerant communication architectures in an easy, cost-effective manner without the need for intermediary communication hardware.

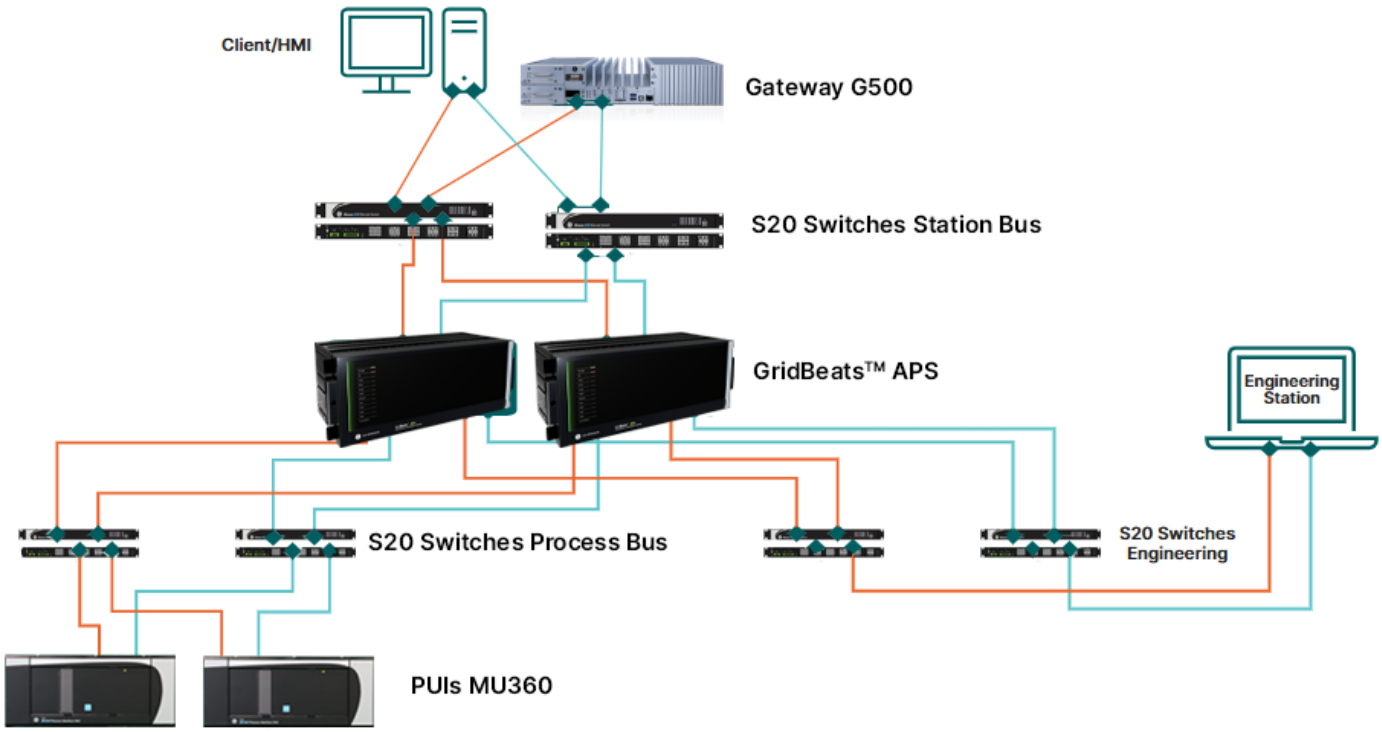
GridBeats™ APS supports the most popular industry standard protocols enabling easy, direct integration into digital substation with station and process bus networks.

- IEC 61850 Ed. 1 and Ed. 2.1 Station Bus, IEC 61850-9-2LE SV, IEC, IEC 61869 networked Process Bus, MMS file transfer
- DNP 3.0 TCP/IP and optional serial
- IEC 60870-5-103 and IEC 60870-5-104
- Modbus TCP/IP, optional Modbus RTU
- HTTPS, SFTP
- IEEE 1588 and redundant SNTP for time synchronization with PTP master capabilities
- PRP/HSR redundancy as per IEC 62439-3
- Supports Routable GOOSE (R-GOOSE) with security

Purpose Specific Local Area Networks (LAN)

Local Area Networks have become an essential part of the substation communication infrastructure at the station and bay levels, with increasing adoption at the process bus level as well. The six independent Ethernet ports allow users to segregate heavy traffic to different networks (e.g. synchrophasors) from mission critical services (e.g. GOOSE, sample values, helping to reduce potential latency impacts.

These ports also support connections to other networks/devices within the system as well as upstream network connectivity. In addition, they provide connections to local devices such as PCs, meters, or virtually anything else in the system.



Precision Time Protocol - IEEE 1588

GridBeats™ APS devices support the IEEE 1588 v2 (2019) time synchronization protocol that enables time synchronization via the substation LAN with no sacrifice on time accuracy (1µs). IEEE 1588 removes the need to have dedicated IRIG-B wiring and repeaters for time synchronization.

Interoperability with Embedded IEC 61850 Ed. 1 and Ed. 2.1

The IEC 61850 implementation in GridBeats™ APS places GE Vernova as an industry leader in this standard:

- Implements, user selectable, Ed. 1 and Ed. 2.1 of the standard across the entire platform.
- Provides full relay setting management via standard SCL files (ICD, CID and IID).
- Enables automated relay setting management using 3rd party tools through standard file transfer services (MMS and SFTP).
- Increases the number of Logical Devices and data mapped, GOOSE messages from up to 128 remote devices, >100 report control blocks and flexible data model to support different organizational needs for data transfer while reducing dependency on generic logical nodes.
- Configures GridBeats™ APS devices with universal third party tools.
- Multicast IEEE C37.118 synchrophasor data between PMU and PDC devices using IEC 91850-90-5.
- R-GOOSE enables sending GOOSE messages beyond the substation, enabling WAPC and more cost-effective communication architectures for wide area applications with security.

LAN Redundancy

Substation LAN redundancy has been traditionally accomplished by reconfiguring the active network topology in case of failure. Regardless of the type of LAN architecture (tree, mesh, etc.), reconfiguring the active LAN requires time to switchover, during which the LAN becomes unavailable. GridBeats™ APS devices deliver PRP and HSR redundancy as specified by IEC 62439-3, which eliminate the dependency on LAN reconfiguration and the associated switchover time. The GridBeats™ APS becomes a dual attached node that transmits data packets over both main and redundant networks simultaneously. In the event of failure, one of the data packets will reach the receiving device without delay.

Six ethernet ports provide users with up to 3 pairs of redundant network connections

IEC 61869 and 61850-9-2LE Process Bus

Four out of the six Ethernet ports provide support communicating to Process Interface Units (PIU) that comply to either IEC 61869-9 SV and -13 GOOSE standards or the IEC 61850-9-2LE technical report. PIUs connect to the primary asset and translate analog signals and digital status/commands to standard sample values (SV) data and GOOSE messages. Flexibility for connecting to different network sizes and topologies is granted through 100Mbps and/or 1Gbps Ethernet port support, in addition to IEC 62439 PRP or HSR standard redundancy, and Star, Ring and Point-to-point network support.

For time synchronization purposes, the GridBeats™ APS device can become an IEEE 1588 slave clock (61850-9-3 profile) or a 1588 Master clock which removes the need for external time sources connected to the process bus network.

Customers who may not be using GE Vernova PIU devices could use PIUs from other vendors. Interoperability with PIUs from other vendors

is expected when they comply to the above-mentioned standards.

Cybersecurity

GridBeats™ APS devices are designed to deliver full cybersecurity features complying with the IEC 62443 standard. There are three cybersecurity levels with functionality that matches security levels SL2, SL3 and SL4. The lowest level (SL2) is enforced to ensure that P&C schemes are protected. Higher security levels can be ordered with the device or can be deployed in the field via an application code upgrade. Core features:

Identification and Authentication control (IAC)

This includes elements for User Identification, Multi-factor Authentication and Device Authentication.

System Integrity

Enabling Secure boot, tamper detection and protection of physical interfaces, such as tampering detection when front panel opens.

Role Based Access Control (RBAC)

Efficiently administrating users and roles within GridBeats™ APS devices, the new and advanced access functions allow users to configure multiple roles for a number of configurable users with independent credentials. The standard "Remote Authentication Dial In User Service" (RADIUS) or Lightweight Directory Access Protocol (LDAP) are used for authentication. Access to the device is strictly controlled by automatically closing user sessions.

Event Recorder (Syslog for SEM)

All cybersecurity-related events are captured within the Standard Operating Element (SOE) element (login, logout, invalid password attempts, remote/local access, user in session, settings change, FW update, etc.), and then served and classified by security level using the standard Syslog data format. This enables GridBeats™ APS devices to integrate with established SEM (Security Event Management) systems.

Hardware TPM

A Trusted Platform Module (TPM) chip is used to secure the GridBeats™ APS hardware with integrated cryptographic keys. This TPM helps prove a user's identity and authenticates their device. A TPM also provides security against threats like firmware and ransomware attacks.

Packages

Application functionality for GridBeats™ APS device is selected via choosing packages. When put together, these packages conform an Application Code.

There are different types of packages to choose from; each type indicates the kind of functionality available for selection:

Communication packages

These consist of a group of communication services to enable communications for the following architectures: Network, Process bus, WAM and Legacy.

Cybersecurity packages

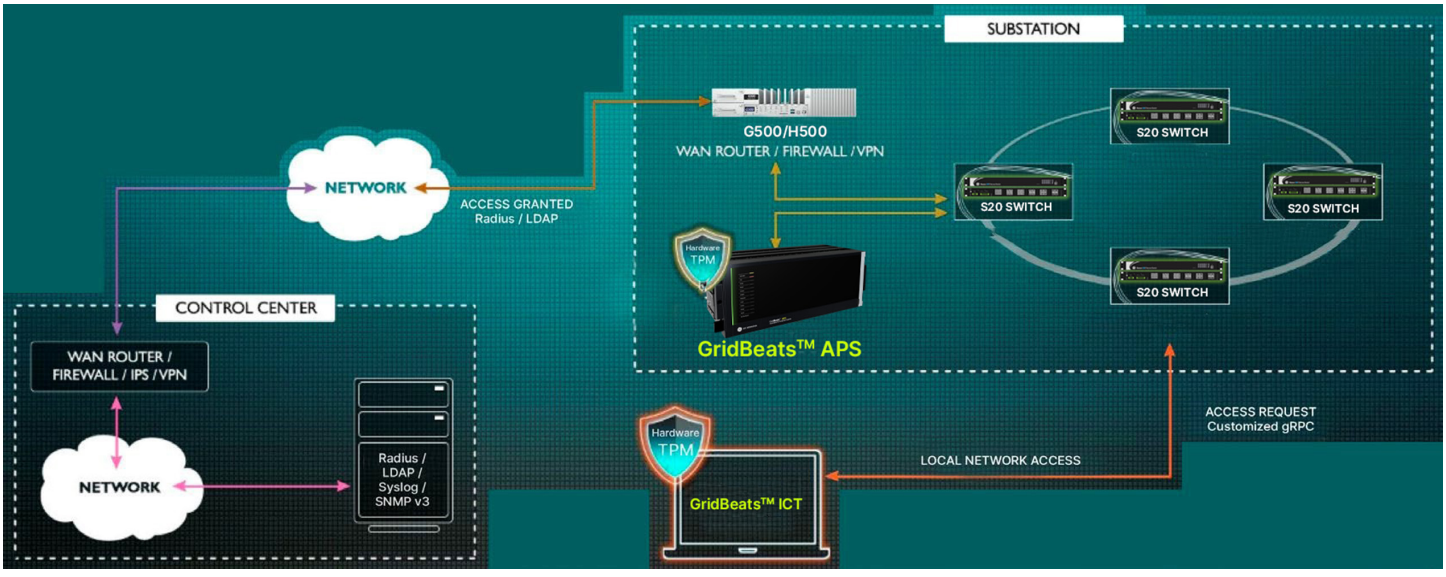
These packages allow to select cybersecurity levels in compliance to IEC62443. SL2, SL3 or SL4

P&C Packages

These are the main packages providing protection and control capabilities. They allow the selection of type and quantity of the power assets for protection, such as feeders, transformers, busbars, DFR, etc.

Support and M&D packages

These are dedicated to optional functionality that can be added to P&C packages. Examples are PMU, SV stream, AVR, TWFL, etc.



GridBeats™ IED Configuration Tool (ICT)

GridBeats™ ICT is an industry-leading set of software programs that simplifies every aspect of using GridBeats™ APS. The device configuration features are designed to optimize the configuration process, supporting different operating systems with a modern look and feel.

This set is a powerful software package that provides users with all the setup and support tools needed for configuring and maintaining GridBeats™ APS products. The setup software allows for device configuration in real time using USB or Ethernet connections, or offline by creating setting files that can be sent to devices later. Exporting/importing settings is possible, allowing customers to transfer specific settings from one file to another. It supports IEC61850 top-down engineering to enhance customer engineering solution delivery.

The suite also provides all the tools to monitor the status of the protected asset, maintain the relay, and integrate information measured from the GridBeats™ APS into DCS or SCADA monitoring systems. Convenient COMTRADE and SOE viewers are integral parts of the software included with every GridBeats™ APS relay, enabling fault analysis and ensuring proper protection of the system operation.

Order Code

Hardware Code

Hardware code structure and most relevant options are shown below.

	Chassis & PWR supply		AC, I/O, RA and other modules											CPU & SFPs			FW versions and MODs			Compressed Application code	
Device	Chassis & Front Panel	PWR	I/O full IRC 2nd PSM	I/O full **AC in RAU PBEM** or I/O compact	I/O compact	I/O full or IRC with 2nd PSM	I/O compact	I/O full **AC in RAU PBEM**	I/O full	Support plate - no module	I/O full **AC in RAU PBEM**	I/O full or compact	I/O compact	CPU type	CPU SFPs	CPU IRC SFPs (for 2 or 4 CPU ports only)	P&C FW (RT)	Platform FW (NRT)	MODs	Pre-configured Application	**Description**
		Slot 1	Slot 2	Slot 3	Slot 3.5* Slot must display as "GUU" if previous slot is populated	Slot 4**	Slot 5.5*	Slot 6	Slot 7		Slot 8	Slot 9	Slot 9.5* Slot must display as "GUU" if previous slot is populated	Slot 10						- Not to be displayed by ICT	*** = compact Modules only**
APS	*	*	D **	F **	G **	H **	K **	L **	N **	R	S **	U **	V **	*	*	*	****	****	***	******	***= compact module only when 40TE is selected**
	D																				40TE chassis & Basic front panel D: USB port and LEDs
		H																			PWR Supply module H: 125 / 250 V AC/DC (look at Spec from NTP)
		L																			PWR Supply module L: 24 - 48 V (DC only)
														B							CPU module B: 4 Eth Ports (SFP pluggable)
														H							CPU module H: 4 Eth Ports (SFP pluggable) + 64Gb extended memory
				XX				XX			XX										No AC module XX
				8W				8W			8W										AC module 8W: 4 CT + 4 VT inputs configurable - 1ph / 3ph
			XX	XX	XX	XX	XX	XX	XX		XX	XX	XX								No I/O Module XX
				6P => UU		6P		6P	6P		6P	6P => UU									I/O module 6P: 6 Form-A (Current w/ opt Voltage) Outputs, 4 Digital Inputs
			6W	6W => UU		6W		6W	6W		6W	6W => UU									I/O module 6W: 30 Contact Inputs - Pin Terminals
			6X	6X => UU		6X		6X	6X		6X	6X => UU									I/O module 6X: 18 Form-A (No Monitoring) Outputs - Pin Terminals
			6Y	6Y => UU		6Y		6Y	6Y		6Y	6Y => UU									I/O module 6Y: 12 Contact Inputs + 11 Contact outputs (two monitored) - Pin terminal
			XX	XX		XX		XX	XX		XX										No transducer module XX
			XX			XX															No IRC module XX
				XX				XX			XX										PBEM / RAU XX: No module
				RA				RA			RA										RAU module RA: interface to 8 RA33x units, 8 ports, 4 SFPs included.
															C						CPU Transceiver C: 4 x SFP 100Mbps fiber, 820nm, MM
															D						CPU Transceiver D: 2 x SFP 100Mbps fiber, 820nm, MM (Ports 1&2) + 2 x SFP 1Gbps fiber, 820nm, MM (Ports 3&4)
															E						CPU Transceiver E: 2 x SFP 100Mbps fiber, 820nm, MM (Ports 1&2) + 2 x SFP 100Mbps RJ45 copper (Ports 3&4)
																X					No CPU IRC Transceiver X
																			XXX		No MOD XXX
																				XXXXXX	Unique identifier from Application code coding: No App package

Application Code

Application code structure and most relevant options are shown below.

Application Code

Platform name		Network			Application pkgs: P&C, DFR, CPC, Support and M&D																												Package description
Software packages		Pkg #1 Comms	Pkg #2 Cyber security		Pkg #3	qty	pkg #4	qty	pkg #5	qty	pkg #6	qty	pkg #7	Qty	pkg #8	Qty	pkg #9	Qty	pkg #10	Qty	pkg #11	Qty	pkg #12	Qty	pkg #13	Qty	pkg #14	Qty					
	APSA	**	**	-	**	*	**	*	**	*	**	*	**	*	**	*	**	*	**	*	**	*	**	*	**	*	**	*					
Communication Packages		**I0**																															Comm pkg I0: Standard_Ethernet
		I1																															Comm pkg I1: Standard Process bus
Cybersecurity Packages			**S2**																														CyberSentry S2: Level 2 - IEC62443 Compliance SL2
P&C / DFR Packages							XX	x	XX	x	XX	x	XX	x	XX	x	XX	x	XX	x	XX	x	XX	x	XX	x	XX	x					No Package
					F2	**1 . 2**	F2	1...2	F2	1...2	F2	1...2																					P&C pkg F2: Advanced Feeder
					R1	1...2	**R1**	1...2	R1	1...2	R1	1...2																					P&C pkg R1: DFR-1

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