GE VERNOVA

Mark* VIe Control System Extended Lifecycle Policy

The following Lifecycle Policy applies to GE Vernova's Mark VIe Control System products, which include Mark VIe general purpose, Mark VIeS, EX2100e and LS2100e. In response to faster consumer electronics lifecycle, GE Vernova adopted a modular architecture in 2004 to decouple electronic components from full platform obsolescence. This Policy outlines how the lifecycle of individual hardware and software components are determined and provides the customer with options to maintain their own strategy in a way that best meets their business goals. This provides an opportunity for customers to lower their cost of ownership by reducing capital expenditures and improving serviceability. The new modular architecture reduces the need to fully replace entire cabinets at regular intervals, rather replacing individual components and implementing software updates annually.

Since the introduction of the Mark VIe series of controls, the platform has remained state-of-the-art and in use across multiple applications within the Power Generation and Oil and Gas industries using GE Vernova's portfolio of products (Gas, Steam, Wind, Hydro, Solar, Battery, Compressors, Nuclear), compressors and expanders, plant equipment (DCS for Process Island and BOP, HRSG), and many others.

Mark VIe users have experienced stable and predictable controls performance that has driven increased availability and reliability of their controlled equipment. The Mark VIe platform is engineered in such a way that we can address technology improvements or obsolescence at the component level, enabling a long life for the platform. This approach also enables new feature enhancements through small incremental upgrades to the Mark VIe, giving our customers confidence that the control system can have a long service life, paralleling the life of their asset.

The modular Ethernet-based architecture, interoperable building blocks, rugged design, and versatile ControlST* software suite of the Mark VIe are intended to promote the vitality of the product portfolio for many years to come.

Customers benefit from this lifecycle approach in the following ways:

- Reduced cost of obsolescence-driven upgrades by only replacing components when necessary
- Spreading maintenance costs over time, instead of complete system replacements every 10-15 years
- Plant machinery and controls upgradability without controls system replacement
- Easy incorporation of new technology or upgraded parts by staying current with ControlST software suite
- Avoiding operations disruptions with on-line repair capabilities
- Security resiliency with regular patch updates
- Fast and simple additions to accommodate changes in the plant equipment over time

Product Lifecycle Overview

Hardware

GE Vernova currently describes the lifecycle of the Mark VIe Control System and Mark VIeS Safety Control System hardware components in three phases, as follows:

- Active Manufacturing
- Limited Production
- End-of-Life Support

Active Manufacturing The component is actively manufactured and is shipped as a standard part for new and upgrade projects.

Limited Production The component is no longer actively implemented for new installations, will eventually become obsolete, and a recommended component replacement or solution is available. Orders for components will be filled based on subcomponent availability or, alternatively, can be repaired through a GE Vernova repair and return authorized facility. We recommend that customers who have components that are in Limited Production consider securing spare parts, plan to upgrade to newer components, or stay current with the latest version of ControlST so that the newer component can be inserted with ease at the time of need.

End-of-Life Support The component can no longer be feasibly manufactured. Support is provided on a commercially reasonable best effort basis without warranty. Similarly, repair and return services are also available on a commercially reasonable best effort basis, but GE Vernova cannot guarantee such availability. We recommend customers plan to refresh as soon as possible their components that have transitioned to the End-of-Life Support phase. Prior to the transition from Limited Production phase to End-of-Life Support phase, GE Vernova endeavors to provide a last time buy offer based on its then current ability to manufacture parts.

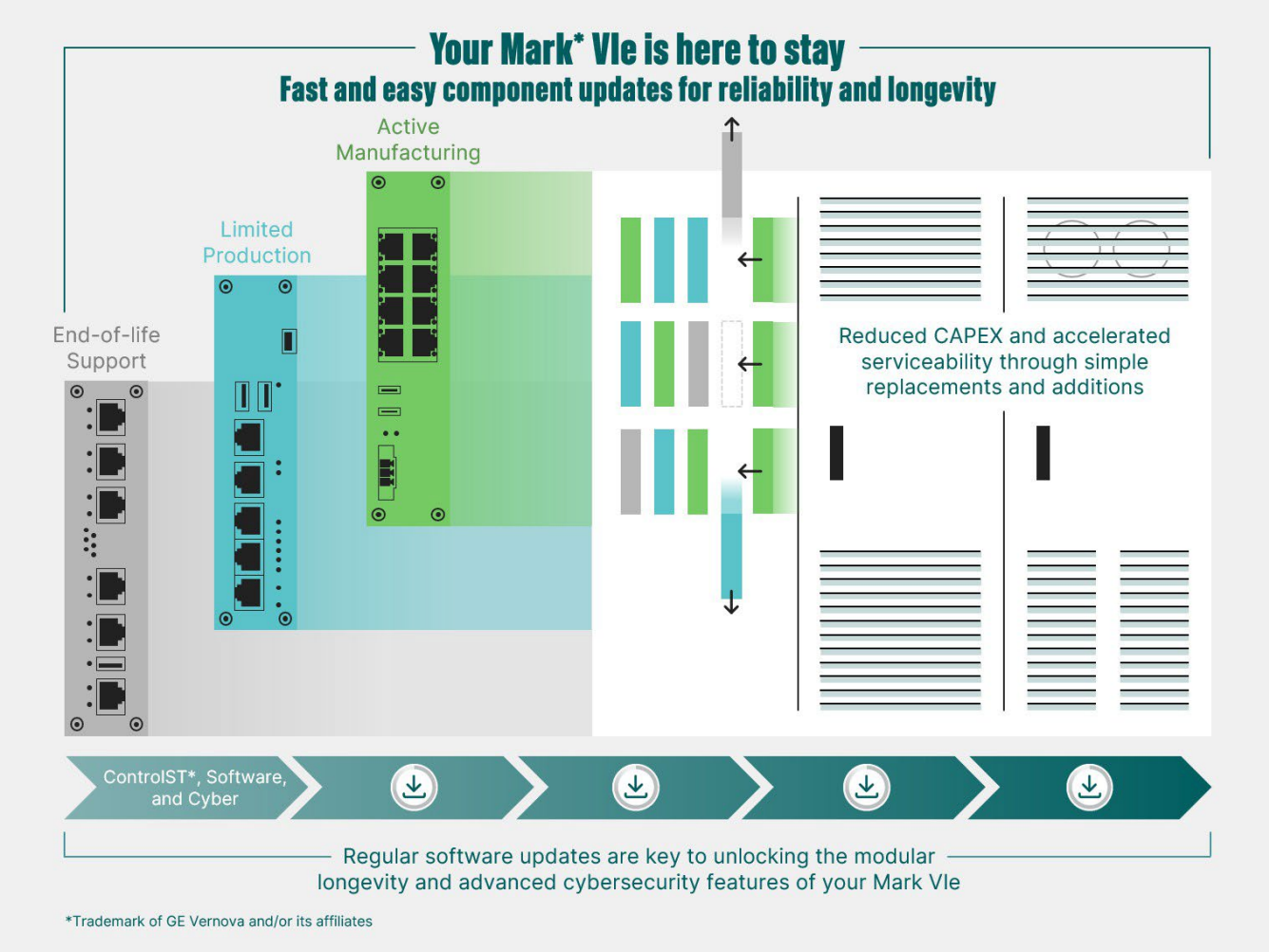
Software

GE Vernova describes the lifecycle of Mark VIe Control System and Mark VIeS Safety Control System Software in two ways:

- Current Release
- End of Development

Current Release Software that is currently available for use and is in active development to provide new feature enhancements, improvements to existing features and patching for newly discovered software vulnerabilities and bug fixes.

End of Development Software that is no longer actively developed to include new features and patching. GE Vernova recommends that customers utilizing End of Development software move to the Current Release software that is available to ensure best cybersecurity practices and support for the latest hardware offerings.



Mark VIe Lifecycle Model

Generator Controls (EX2100e & LS2100e) Lifecycle

GE Vernova's EX2100e Excitation System and LS2100e Static Starter power electronics products are based on the Mark VIe control hardware, software, network, and security. These systems integrate Mark VIe technology with a portfolio of scalable power electronics solutions to control and protect turbine-driven utility and industrial generators of all sizes. The modular Mark VIe architecture combined with the long life of most power electronics ensure decades long product life for our customers. Because of the different nature of the control versus power electronic technologies, GE Vernova will manage the lifecycle status of these with separate lifecycle oversight. The control technology portion of the EX2100e and LS2100e will progress consistent with the rest of the Mark VIe system while the power electronics and electrical auxiliaries will align with lifecycles consistent with the vendor components integrated into the solutions. GE Vernova will provide customers with separate lifecycle guidance and update notices with objectives to achieve high reliability and availability while realizing extended operational life.

Windows Operating System Lifecycle and Support Model

GE Vernova's Mark VIe platform software runs on the Microsoft Windows® Operating system (OS). Since the introduction of the Mark VIe, we have shipped many versions of Windows operating systems. As part of the Mark VIe obsolescence plan, the Windows operating system's end of support must be taken into consideration. Once an operating system is no longer supported by Microsoft, we can no longer guarantee the software will continue to operate. Combined with the lack of cybersecurity updates, it is important to ensure your Windows-based systems are within their support window published by Microsoft.

To help ensure the longevity of customer Windows computer systems, we offer the current Windows versions that are supported for longer terms via Microsoft's Long Term Service Channel. To understand the lifecycle support dates and policy for the Windows version installed at your facility, please visit the Microsoft website (*https://learn.microsoft.com/en-us/lifecycle/products/?products=windows*).

To determine which version of ControlST runs on which version of Microsoft Windows operating system, please refer to the document GEI-100694 in the Mark Controls Documentation section of the customer portal (*https://customerportal.gepower.com/new/mark-controls-documentation*).

Please note that published extended support dates may be changed by Microsoft at any time. GE Vernova continually improves its support and migration plans to best suit customers' needs based on the released Microsoft support dates.

ControlST Support Model and Release Frequency

ControlST, developed and maintained by GE Vernova, is an integrated suite of Windows-based tools and component firmware for the Mark* controls products. The ControlST applications span a wide variety of power generation plants and other industrial equipment. The suite is constantly evolving to improve customer experience, network security, enhance plant operation and keep pace with advancements in technology.

The ControlST software suite, by default, maintains backward compatibility with all Active Manufacturing and Limited Production phase Mark VIe components, as defined at the time of its release. Mark VIe components in End-of-Life Support phase will remain supported within the ControlST software suite but will transition to a supplemental package - at such point, the capabilities will be frozen in time and will no longer be updated or patched. Maintaining the HMIs by updating to the latest ControlST version allows users to easily and expediently replace older Mark VIe components with new Mark VIe components as they are released.

Installing the latest ControlST software suite release is the best way for a customer to ensure that they are operating the Mark VIe platform with the highest availability, security, and functionality. It also ensures customers can adopt the latest part with little to no downtime and without unpredictable failures.

With each major version release of a ControlST product, unless otherwise specified by GE Vernova, we endeavor to maintain the last two major versions for at least two years with a current software release. Within each major version, GE Vernova will maintain the latest updates in the most recent minor revision release. For more information on the latest release of ControlST version and the last two supported versions, please refer to the document GEI-100746, *ControlST Release Notes* in the Mark Controls Documentation section of the customer portal (*https://customerportal.gepower.com/new/mark-controls-documentation*).

Proficy Product Suite Support Model and Release Frequency (CIMPLICITY and Proficy Historian)

We are continuously improving the Proficy Product Suite which includes all Proficy* Software including iFIX and CIMPLICITY products. The current model for CIMPLICITY licensing is perpetual based. The current version of a product will remain under ongoing support until GE Vernova either releases a new version or announces an expected end-of-life date. With each major version release for a product, unless otherwise specified by GE Vernova, we endeavor to maintain the previous major version (including related minor and maintenance releases) for two years with ongoing support.

Typically, one major version of CIMPLICITY is released every year and the latest two CIMPLICITY versions are supported and receive bug fixes and updates.

CIMPLICITY covers the current licensed version and the previously released versions. For example, the v11.1 license does not cover v11.5 but will cover v9.0.

For the more information on the supported versions and End-of-Life notifications, please refer to this customer link: *GE Vernova Supported Versions & Bulk End of Support Notification for Proficy© Product Suite*

Default Policy on non-GE Vernova Products

For non-GE Vernova sourced products, including third-party embedded software, GE Vernova endeavors to have our suppliers commit to long-term availability of their products. We will continue to support and supply third-party products if they are available to us and will offer suitable replacements as needed. Examples of these commonly used software products include AVEVA PI Historian and Broadcom VMware virtualization software. Please refer to the specific software vendor supported versions and end-of-life information websites for more information.

Cybersecurity Solution: OTArmor Lifecycle

The third-party software components included in OTArmor are available with a varied term license software support and maintenance agreement from the software OEMs. Depending on our relationships, tier 1 and tier 2 support will be provided by GE Vernova, with tier 3 support from the OEM. Longer terms for support and maintenance must be achieved through an aftermarket GE Vernova Controls Systems and Solutions service contract.

The third-party software provided with OTArmor includes a mix of software with perpetual licenses and annual subscriptions. It is also important to note that certain software will no longer function after the annual subscription expires. To provide the best cyber security posture, all OTArmor equipment in use must be in active production lifecycle or replaced after transition from active production.

Human Machine Interface (HMI) Hardware Lifecycle

The industry standard lifecycle for hardware deployed to host Cyber, Historian and HMI functions is 3-5 years and are supplied by various OEMs but not limited to Advantech, Dell, HP, and Lenovo. GE Vernova has deployed commercial desktop PCs, server hardware, industrial grade PCs and panel mount HMIs. Generally, it is possible to get support on the HMI hardware for an additional two years from their standard lifecycle, provided an extended warranty is purchased at the time of hardware ordering. Standard warranty provided by GE Vernova is two years, and it is recommended to refresh the HMI hardware to avoid any reliability issues and to maintain cyber security posture.

We provide regular functional replacements for HMI hardware as needed due to product end of life.

Network Switches, Firewalls and Routers Lifecycle

Typically, network switches, firewalls and routers are supported by the OEM for a period of 5-10 years but individual product lifecycle on this equipment is managed by the OEM. In addition, service agreements might be required to be signed with OEM's to continuously receive firmware updates which addresses any known vulnerabilities, bug fixes and additional features. Furthermore, GE Vernova continuously tests and validates the firmware made available by OEMs to ensure the installation of firmware does not affect the network or plant operations. Prior to network switches, firewalls, or routers reaching end of life, GE Vernova selects suitable replacements from the same vendor to help ensure the network functionality is maintained. In addition, GE Vernova will release end-of-life notifications along with recommendations in the *customer portal* for necessary action by customers.

Controls Lifecare Services – A way forward to manage the Mark VIe platform throughout its lifecycle

GE Vernova is committed to cost effective lifecycle management support for customers by providing a wide range of hardware (new, refurbished and reclaimed) components, software solutions and maintenance services to keep the Mark VIe, EX2100e, and LS2100e systems in continuous service with minimal downtime and maximal reliability.

GE Vernova understands that the Mark VIe system's lifecycle needs vary between customers and can be driven by many factors. Customers are experiencing increased cybersecurity regulations across the globe and having a path to patch software continuously is critical to comply with cybersecurity regulations. For some users, the necessity to replace or renew hardware components could arise from parts issues. For others, an upgrade to the latest Mark VIe hardware (for example, UCSE Controller) along with the latest ControlST software is required to enable the installation of advanced controls software (for example, Model Based Control, OpFlex Software) for plant output or heat rate improvements. Additionally, it may be necessary to accommodate additions or changes to the plant equipment over time.

Given the diverse needs of lifecycle management and the Mark VIe platform architecture's very long life, we have developed a portfolio of services called *Controls Lifecare Services* to help deliver generational improvements. These include hardware and software updates, such as network switch firmware updates, on a continuous or incremental basis, to keep the Mark VIe platform healthy, secure, and updated throughout its entire lifecycle.

Our versatile and scalable services known as *Controls Lifecare Services Program (CLS)* can be provided in a long-term agreement format and can be customized to help meet your plant specific requirements, operational objectives, and resource capabilities. We can help you select the best solutions from our CLS portfolio so that you can achieve your business goals.

As part of CLS subscription, customers can also request a login to the CLS Central Portal which provides access to the hardware and software lifecycle insights dashboard, or request GE Vernova to provide a Mark VIe lifecycle assessment. This enables customers to plan for necessary maintenance actions during upcoming outages or to perform long-term budgeting for incremental upgrades and parts inventory.

To learn more about GE Vernova' s Controls Lifecare Services (CLS), please visit our website (*https://www.gevernova.com/gas-power/services/digital-and-controls/lifecycle-services*), or contact us by e-mail at *controls.lifecare@ge.com*.

For any questions on this lifecycle policy or any offerings of products and services mentioned herein, please contact GE Vernova's Gas Power or Control Solutions and Services (CSS) sales managers, customer service representatives or, send an e-mail to *controls.lifecare@ge.com* for services queries and to *controlparts@ge.com* for parts queries.

For further assistance or technical information, contact the nearest GE Vernova Sales or Service Office, or an authorized GE Vernova Sales Representative.

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