Power and Water Cybersecurity Suite – System Backup & Recovery

Features

- Supports compliance for NERC CIP-009 backup and restore requirement
- Provides a solution for disaster recovery
- Implements and restores image backups of control systems
- Offers disk-level protection
- Provides full, incremental, or differential backups
- Executes scheduled, event triggered, or manual backup schemes with conditions
- Offers universal restore of system workstations and servers

Overview

Unplanned power generation outages can be costly events due to lost revenue, purchasing replacement power, incurring environmental penalties, and a loss of public confidence. An interruption to water or wastewater treatment processes can endanger community trust as well as cause property loss (including data) and potential environmental damage.

Process disruptions can be caused by several factors from equipment failures and human errors to cyber incidents or natural disasters. A well-thought-out contingency plan with rapid restoration capabilities can minimize losses. The most important step of a viable contingency plan is creating a strategy for efficient and effective control system recovery following a disruption.

A traditional recovery plan includes finding suitable replacement equipment with the proper operating system, sourcing the original application software with correct licensing keys, and then reloading the customer-specific software with validation – a process that is very delicate and time consuming.

Rapid recovery requires capturing and archiving dynamically changed control system data before any unanticipated incident occurs.

A comprehensive contingency plan can accelerate the recovery process by reapplying the target station's image extracted from the archives and returning the station or whole system back to normal operation. The contingency plan should also include a disciplined backup procedure that manages system development and routine maintenance.

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Solution

While backup and recovery functions are included with every Ovation system to restore the Database Server, additional full-system protection to Ovation and non-Ovation systems is available using the Power and Water Cybersecurity Suite's System Backup & Recovery application. System Backup & Recovery provides complete disk imaging, which means that everything on your workstation is backed up – operating system files, database files, applications, file systems, and so forth. Disk imaging software eliminates the need to perform a costly and time-consuming restore of the operating system separately from the contents of the system.

The functionality can be further configured so that the backup can be triggered by events, and any corrupted data can be retained for further analysis and diagnosis. Using the System Backup & Recovery utility allows a safe computer recovery from a system crash or a damaging virus infection without first reformatting and reinstalling the operating system. They can both be recovered at the same time.

The fundamental significance of the CIP-009 standard is to ensure a rapid recovery of a control system from any disaster: cyber, natural, or human-error incidents. The System Backup & Recovery technology addresses this need by providing a full restoration capability of the control system whether it is to existing or new hardware.

Benefits of Emerson's Solution

Emerson's System Backup & Recovery utility incorporates easily into a control system's architecture and facilitates the creation and restoration of image-level backups of system assets. Emerson's solution includes full support for "bare metal" restoration for both disaster recovery and limited point-in-time restoration purposes.

System Backup & Recovery is distinguished from out-of-the-box third-party products in that it incorporates Acronis Backup & Recovery software (a trusted, proven, and recognized industry-leading backup and recovery software package) integrated with Emerson's proprietary software. This combination provides a solution that is tailored to the flexibility and capabilities of the Ovation product line. It also allows Emerson to expand capabilities and support a wide range of Ovation add-on products.

Backup

The System Backup & Recovery utility consists of a single management server with agents loaded on each Windows workstation and server, along with a network attached storage unit that provides various fault tolerance capabilities for storage. Backups can be accomplished using two different methods:

- Full backup – stores all data selected for backup and forms the base for incremental and differential backups. It can be used to roll back the system to its initial state.
- Incremental backup – stores changes to the data against the latest backup. This is useful when data changes are small, and there is a need to roll back to any one of multiple saved states.

Recovery

The System Backup & Recovery utility supports a standard recovery, which restores a backup image to the original machine, and a Universal Restore that restores the backup image of the source machine to a different target machine.

Default backup and recovery options are pre-defined with values stored in each agent. These values can be modified specifically to each backup and recovery plan.

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Storage and Vault

Storing backup archives requires a designated location or a vault for ease of use and administration. Multiple vaults can be created if needed, and each vault can be managed or unmanaged by the storage node. The network attached storage unit is configured as the vault for the backup archives.

Management Server Software

The Management Server software drives data protection to the targeted system or systems. This server software can be loaded on a standalone Microsoft® Windows® station and is capable of servicing multiple systems in a multi-network environment. The server software can also be loaded on a virtual machine within the Power and Water Cybersecurity Suite. The built-in network capability of the suite allows the station to support multiple systems within the same plant.

Agents

An agent is loaded on each Windows station that is resident on the system network. The agent is responsible for performing disk- or file-level data backup and recovery.

Backup Plan

A comprehensive backup plan is essential for a long-term backup strategy. The strategy may include schedules, conditions, and the timely deletion or movement of backups to different locations. The backup schedule is triggered by an event or multiple events. After the backup file is created and stored in the primary location, it can be replicated to a second location for a retention period specified in the backup plan. It can also be replicated for up to five different locations (including the primary one) or be deleted.

Recovery Task

A recovery task can be created for restoring disk, volume, or file data, and reports can be generated with either predefined or customizable templates. Alerts and logs assist with regular operations. The alert can be active if the issue has not been resolved, inactive if the issue has been resolved, or self-healed. The centralized event log stores the history of operations performed by the management server, the storage nodes, and the registered machines.

Power and Water Cybersecurity Suite

The established Power and Water Cybersecurity Suite infrastructure can support multiple systems. In the event of a disaster, system recovery is available from multiple disk images across multiple systems.

The backup files can be sent to several locations, but the network attached storage is the preferred selection, because it provides easy-to-use and high-performance storage, conveniently installed in the Power and Water Cybersecurity Suite cabinet.

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Compliance Summary

NERC Standard	Requirement	Emerson Response
CIP-009-6 R1 Part 1.3	One or more processes for the backup and storage of information required to recover bulk energy system, cyber system functionality.	Regular backups can be automatically scheduled and executed. Each backup can be set for full, incremental, or differential backup.
CIP-009-6 R1 Part 1.4	One or more processes to verify the successful completion of the backup processes in Part 1.3 and to address any backup failures.	Error logs during backups are available through the System Backup & Recovery application or the Windows event log.

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