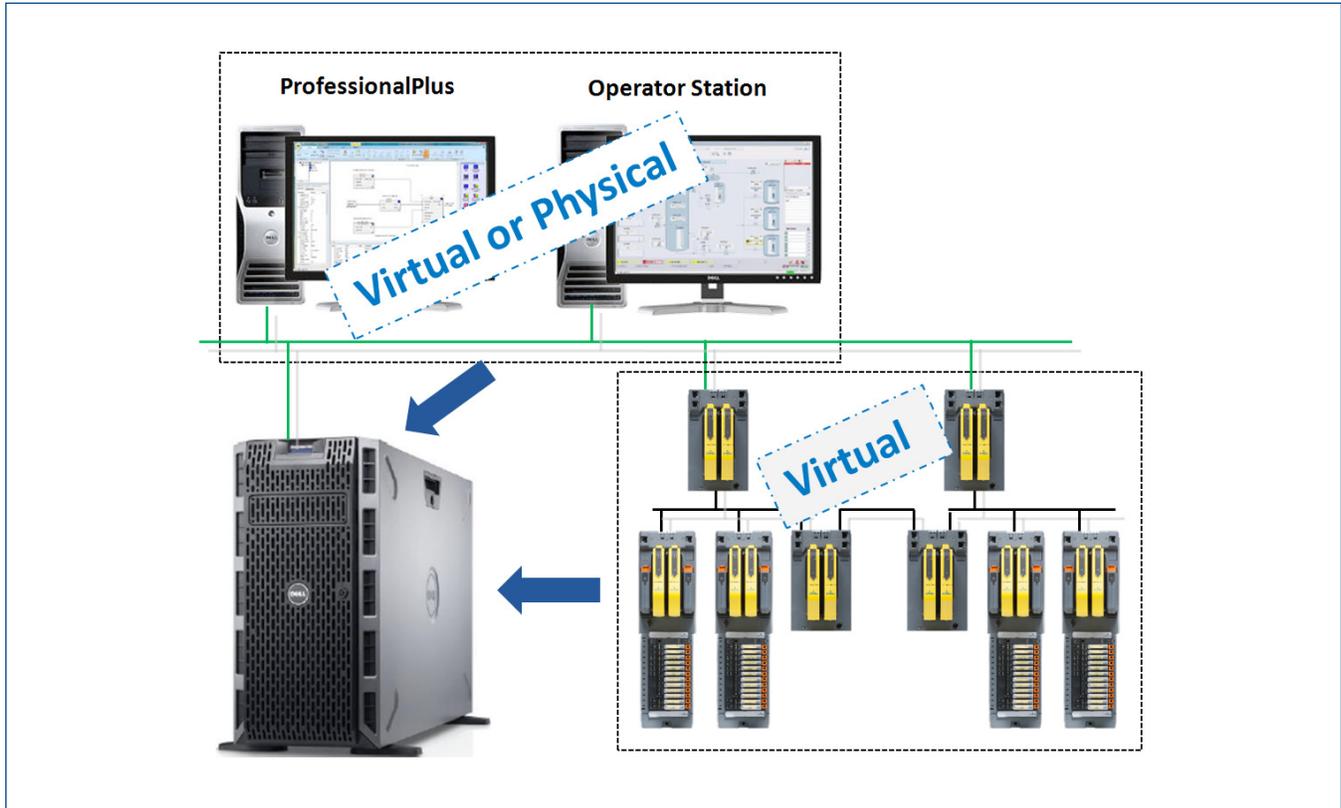


# DeltaV SIS™ with Electronic Marshalling - Virtual Simulation



The DeltaV SIS system provides the ability to virtualize hardware components for DeltaV SIS with Electronic Marshalling to facilitate the development and testing of safety logic.

- Provides virtualization of hardware components for DeltaV SIS™ with Electronic Marshalling.
- Supports rigorous testing of safety logic and operator graphics.
- Requires no configuration changes when transferring configuration to actual hardware.

## Introduction

The virtual simulation solution allows you to configure and test your safety logic without using the DeltaV SIS process safety system hardware. Only a host server is required to setup a virtual environment for simulation purposes. The DeltaV SIS process safety system that can be virtualized has a uniquely scalable modular architecture that is based on the CHARMS smart logic solver (CSLS) and the unprecedented flexibility of the Emerson Electronic Marshalling solution.

In addition to virtualizing the CSLS hardware, all the network components can be simulated. The Local Safety Network (LSN) is the communication backbone of the DeltaV SIS safety system. The LSN is a standard Ethernet network dedicated to the DeltaV SIS process safety system that enables communication among multiple CSLSs and a single SZ controller. The Global Safety Network (GSN) enables safety rated communication among LSNs via the Local Safety Network Bridge (LSNB). For more information about DeltaV SIS, see the *DeltaV SIS with Electronic Marshalling and DeltaV SIS Safety Network Components* product data sheets.

Virtualization is available for all the hardware components in the LSN: CSLS, LSNB, and SZ controller. Simulation of DeltaV SIS safety system with SLS1508 does not use virtualization, for more information about simulation of SLS1508 logic solvers see the DeltaV Simulate product data sheet.

## Benefits

**Provides virtualization of hardware components for DeltaV SIS with Electronic Marshalling.** Virtualization of DeltaV SIS with Electronic Marshalling provides the ability to simulate DeltaV SIS hardware components from a host computer for development of safety logic. The simulated DeltaV SIS components appear the same as physical components in the DeltaV SIS system and require no changes to graphics or safety logic configuration.

**Supports rigorous testing of safety logic and operator graphics.** Virtualization of hardware components for DeltaV SIS with Electronic Marshalling enables testing of safety logic and graphics. SIS modules are tested running in the virtual CSLSs and communicating with other CSLSs across a virtual and virtual GSN.

**No configuration changes for transferring configuration to actual hardware.** Once tested, the entire configuration can be moved to the physical DeltaV SIS system without configuration changes.

## Product Description

The virtual components for DeltaV SIS with Electronic Marshalling follow the same architecture as the physical components. The DeltaV SIS virtual CSLSs reside in the LSN underneath a virtual SZ controller. The virtual CSLSs, SZ controller, and LSNB are created via tested and proven virtualized templates and look the same as real DeltaV SIS components within the DeltaV SIS process safety system. When first connected they appear as unassigned safety nodes in the DeltaV SIS system and can be commissioned the same as real components.

The use of virtual DeltaV SIS components is for offline use only and intended to facilitate the development and testing of safety logic.

The virtual CSLS provides a cost-efficient and easy way to configure, test, and simulate safety logic. Once tested, the entire configuration can be moved to the physical DeltaV SIS system without configuration changes. A simulated virtual CSLS is supported on the DeltaV Virtual Studio or VMware platform.

A virtual CSLS can only communicate with a virtual SZ controller, other virtual CSLSs, and a virtual LSNB. A virtual CSLS cannot communicate with physical nodes on the LSN.

The virtual SZ controller provides the interface to virtual CSLSs and virtual LSNBs. It cannot communicate with physical nodes on the LSN. However, a virtual SZ controller can communicate with other nodes in the area control network (either physical or virtual).

The virtual LSNB allows communication across multiple virtual LSNs either on the same host or different host machines. A virtual LSNB cannot communicate with a physical LSNB.

SIS modules developed in a virtual environment preserve the module Cyclic Redundancy Check (CRC) after being transferred to a physical DeltaV SIS system as long as proper methods are followed. For more information about transferring configuration from a virtual DeltaV SIS offline environment into an online DeltaV SIS environment, see Books online for DeltaV SIS v13 or later.

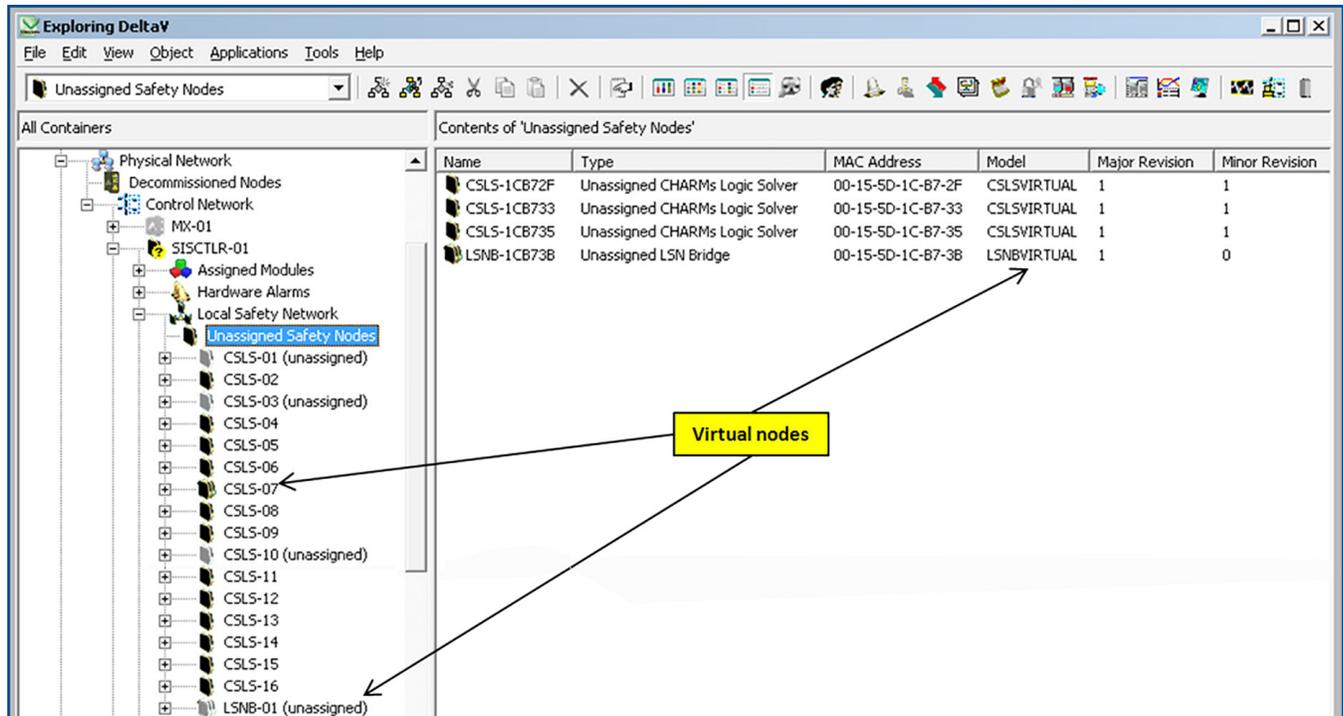


Figure 1 – Virtual DeltaV SIS Example

Note: Virtual DeltaV SIS components reside in the same locations in the DeltaV Explorer as the physical DeltaV SIS components.

## Modbus TCP Interface

The Modbus TCP interface is not supported on a virtual SZ controller. Modbus mapping can be configured in a virtual SZ controller but it cannot be connected to a Modbus master for testing.

## SIS Configuration

SIS modules associated with a virtual CSLS are created exactly the same way as when associated with physical CSLSs. The same SIS function blocks are available to both physical and virtual CSLS. Each virtual CSLS runs in a separate virtual machine on a host computer. Virtual SZ controllers and virtual LSNB are also configured the same way as physical SZ controllers or physical LSNBs. Each Virtual SZ controller or virtual LSNB runs on separate virtual machines. A host computer can run up to 18 virtual machines associated with DeltaV SIS with Electronic Marshalling hardware components. Virtual DeltaV SIS components are supported with DeltaV Virtual Studio, VMware workstation, and ESXi virtualization environments.

The virtual DeltaV SIS components cannot be used in online environments. See DeltaV Virtual Studio product data sheet or VMware Implementation Guidelines for system planning information.

Once the DeltaV SIS virtual components are created and connected to the DeltaV SIS system, you can commission the virtual components in the same way you commission the physical components. Figure 1 shows both virtual CSLs and a virtual LSNB in DeltaV Explorer. Once commissioned, you can simulate CSLS inputs by writing to the simulation parameter in the SIS input blocks.

## I/O Simulation

Once the virtual CSLS is commissioned, you can simulate CSLS inputs by writing to the simulation parameter in the SIS input blocks. Starting DeltaV v14, it is also possible to simulate input signals and read output signals either via an out-of-the-box application or OPC. DeltaV SIS only allow I/O simulation on virtual CSLS which reduces cyber security threats. To fully decouple software and hardware design, users could simulate values based on the signal name (Device Signal Tag or DST). It is no longer necessary to wait until the physical design is completed and the physical address of the signal is known.

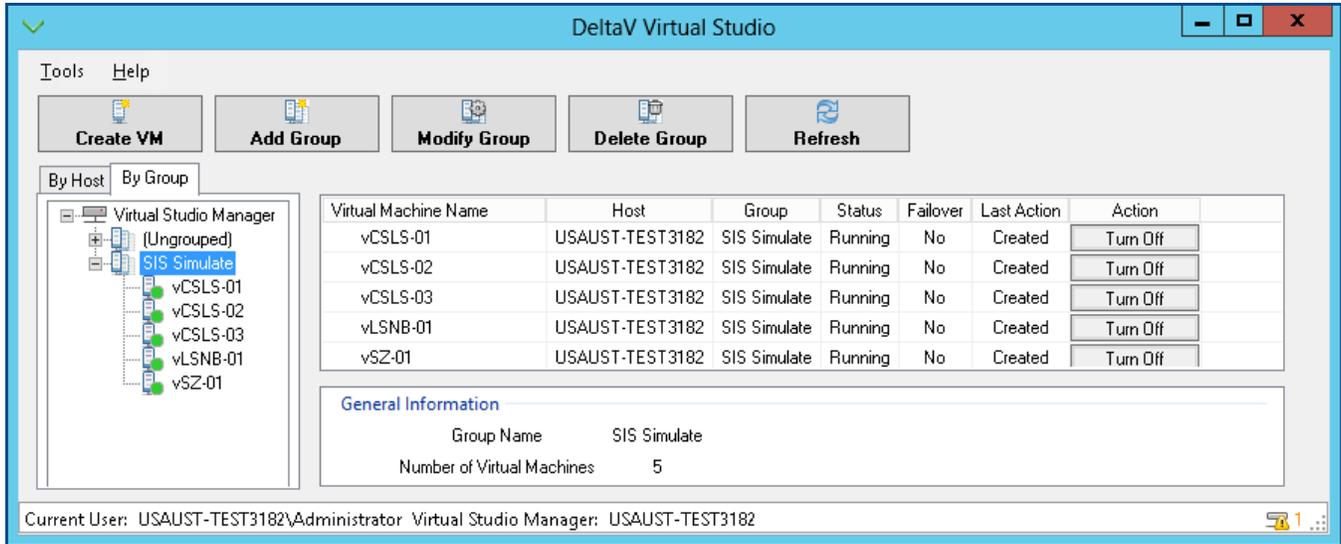


Figure 2 - DeltaV Virtual Studio Application

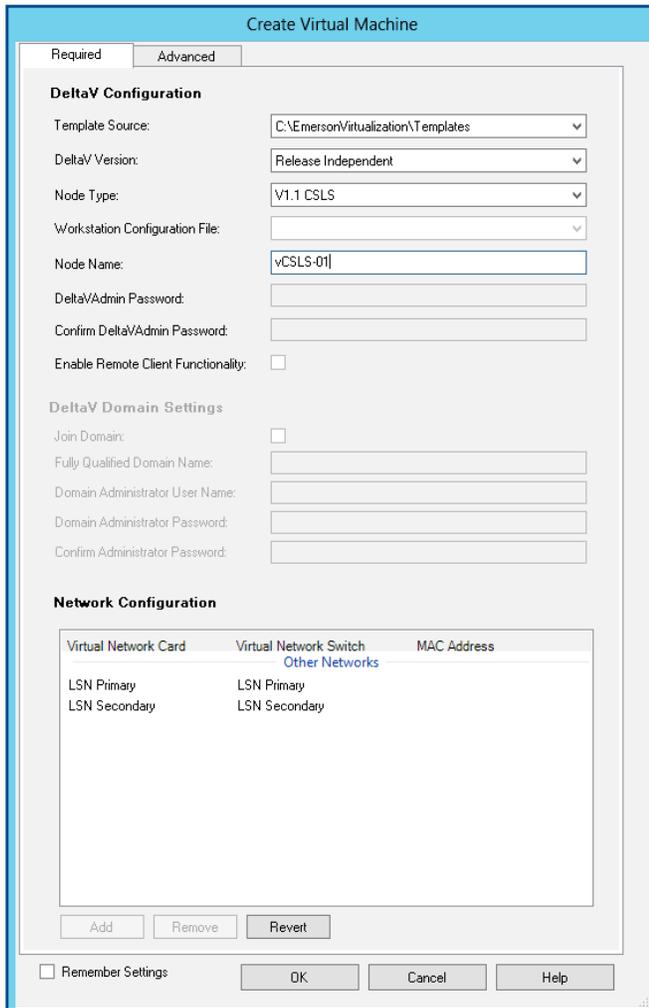


Figure 3 – Creating a virtual CSLS

### DeltaV Virtual Studio

DeltaV Virtual Studio is an integrated DeltaV application environment designed for easy implementation and management of virtual DeltaV and DeltaV SIS systems for offline use. DeltaV Virtual Studio is used to create, modify, start, stop, and move DeltaV and DeltaV SIS virtual machines. Virtual DeltaV SIS components are easily created and assigned to host computers using DeltaV Virtual Studio. Figure 2 shows the DeltaV Virtual Studio application.

Virtual DeltaV SIS components are easy to create and implement using DeltaV virtual machine templates. These templates allow you to easily add virtual DeltaV SIS components from a single configuration dialog. For example, to create a virtual CSLS, simply select to create a DeltaV SIS virtual CSLS from a drop down menu as shown in picture 3, select the network connections from another drop down menu, and press OK. Within a few minutes you have a virtual CSLS ready to commission and configure. *For more information, see the product data sheet for DeltaV Virtual Studio.*

### Licensing

Virtualization for DeltaV SIS with Electronic Marshalling is licensed per virtual SZ controller for a specific DeltaV SIS system ID. There can be up to 16 virtual CSLS and 1 virtual LSNB for each SZ controller. The licenses are sold in quantities of 1 SZ controller as described below. The licenses are tied to a specific system ID and will not operate on multiple DeltaV SIS systems.

## Product Specifications

Virtual DeltaV SIS with Electronic Marshalling Specifications	
Number of virtual machines per host*	18 virtual machines related to DeltaV SIS. Each virtual SZ controller, virtual CSLS or virtual LSNB requires a separate virtual machine. Any combination of SZ controller, CSLS and LSNB is permitted as long as it does not exceed 18 virtual machines total.
Modbus port on SZ controller	Not Available. Modbus is not available for virtual SZ controllers

\*Virtual DeltaV SIS components must run in DeltaV host computers, not traditional DeltaV workstations. See the DeltaV Virtualization Hardware product data sheet for available host computer information.

## Ordering Information\*

Description	Model Number
DeltaV SIS Simulate Virtual SZ Controller Base License; includes licensed capacity for 1 Virtual SZ Controller, 16 Virtual CSLS, and 1 Virtual LSNB	VX3003S001
DeltaV SIS Simulate Virtual SZ Controller Scale up License; includes licensed capacity for 1 Virtual SZ Controller, 16 Virtual CSLS, and 1 Virtual LSNB	VX3003UPS01

\*Ordering information is for licenses only. Software associated with DeltaV SIS with Electronic Marshalling components is provided with the media kits as described in the DeltaV Virtual Studio product data sheet.

## Prerequisites

- DeltaV SIS v13.3 or later is required
- DeltaV SIS v14.3 or later is required for DST simulation via OPC
- DeltaV Simulate multi-node license

## Related Products

- **DeltaV Virtual Studio** is an integrated DeltaV application environment designed for easy implementation and management of virtual DeltaV control systems for both off-line and on-line production systems. Virtual machine templates are provided for automatic generation and configuration of DeltaV workstations and controller hardware. For more information, see product data sheet for **DeltaV Virtual Studio**.
- **DeltaV Simulate** lets you use all DeltaV software for training and development without system hardware, see product data sheet for **DeltaV Simulate**.

## Related Hardware Products

- **DeltaV Virtualization Hardware.** Rigorously tested and supported computer and peripheral devices for use with DeltaV Virtual Studio. Hardware includes host servers, storage area network (SAN), thin clients, network switches, and related hardware required for DeltaV Virtualization. For more information, see product data sheet for DeltaV Virtualization Hardware.

## Related Third-Party Products

- **VMware Workstation and ESXi Hypervisor.** Virtualization of DeltaV SIS with Electronic Marshalling is available and supported for VMware environments.

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