S-series Virtual I/O Module

The S-Series Virtual I/O Module provides DeltaV™ I/O simulation and a high speed Ethernet I/O device integration platform

- Non-intrusive DeltaV™ I/O simulation
- Powerful integration solution
- Easy to use
- Modular, flexible packaging

Introduction

The DeltaV S-Series Virtual I/O Module (VIM) provides nonintrusive simulation of the DeltaV S-Series I/O Cards and digital bus field devices for process simulation when used with MYNAH Technologies' MiMiC Simulation Software. DeltaV Control strategies and system configurations can be fully tested with this powerful simulation interface.

The VIM also provides an interface to Ethernet I/O networks and devices that use the Modbus TCP/IP or Ethernet/IP protocol drivers. DeltaV S-Series controllers can read and write signals from plant floor devices connected to Ethernet I/O networks such as PLC's, Motor Control Centers, and Weigh Scales.

Benefits

Non-Intrusive DeltaV I/O simulation. Use the VIM in conjunction with the **MYNAH Technologies' MiMiC Simulation Software** to simulate your DeltaV S-Series I/O and digital bus field devices.

- **Supports DeltaV I/O modules.** Provides completely non-intrusive simulation of all DeltaV S-Series I/O Modules. Supports autosensing of I/O and accurate testing of controller loading. DeltaV configuration can be fully tested without modifying the control strategies.
- **Digital bus support.** Provides simulation of all DeltaV Digital Busses and Foundation Fieldbus function blocks. Supports Foundation Fieldbus control in the field configuration testing.
- **Powerful simulation solution.** Provides full simulation of up to 64 DeltaV I/O modules per controller. Simulation execution is fast and efficient; the DeltaV controller thinks it's talking with real IO.

Powerful integration solution. Use the VIM in conjunction with the **MYNAH Ethernet I/O** drivers to integrate your DeltaV system with your Ethernet I/O device networks.

- **Large device capacity.** Each VIM emulates four DeltaV Serial Cards and support up to 128 Serial Card Datasets of information from 32 network devices in simplex installations and 16 devices in redundant installations. Communication over the Ethernet I/O device network is fast and efficient.
- **Flexible networking.** User configurable IP addressing allows the VIM to be used in almost any plant environment regardless of networking scheme. The VIM and the Ethernet I/O devices must be on the same IP subnet to communicate.
- **1:1 Redundancy.** Redundancy can be added to any Ethernet I/O system by adding a second VIM and configuring the two cards as a redundant pair. The VIM appears as four redundant DeltaV Serial Card pairs. Automatic switchover of primary to standby cards is handled like the DeltaV Serial Card. The operator is given clear notification of a switchover at the operator display. Manual switchover can be controlled in DeltaV Diagnostics.

Easy to use. The VIM is easy to use and well integrated into the DeltaV system. Specific ease of use features include:

- **Automatic updates.** Simulation I/O driver updates for the VIM are included with the MiMiC software releases. Updates are quick and easy over the simulation network.
- **Seamless Ethernet I/O integration.** When used with the MYNAH Ethernet I/O drivers, the VIM is seen by the DeltaV S-Series controller as four DeltaV Serial Cards. Commissioned VIMs are auto-sensed by the DeltaV controller as DeltaV Serial Cards.
- **Configured in DeltaV Explorer.** Serial dataset configuration used for Ethernet I/O integration is done in the DeltaV Explorer in the same manner as a DeltaV Serial Card. Ethernet I/O signals can be used in DeltaV Control Modules, displayed on DeltaV Operate graphics and stored in the DeltaV Continuous Historian.
- **Intuitive setup.** The VIMNet Explorer application provides plug-n-play capability making setup of the VIM easy and intuitive. Graphical, drag-n-drop, functionality makes setting up multiple VIMs almost effortless. VIMNet Explorer is integrated with DeltaV Explorer to make setup of the VIM easy and intuitive.

Modular, flexible packaging. The VIM mounts in the same manner as the DeltaV controller. It mounts in the controller slot of a DeltaV 2-wide horizontal carrier and uses a standard DeltaV Power Supply. The advanced design of the VIM will provide years of uninterrupted use.

S-Series VIM and power supply

Product Description

The VIM may be used for either DeltaV I/O simulation or Ethernet I/O device integration. The VIM mounts on a 2-wide carrier on the left-hand-side of the DeltaV controller. A dedicated DeltaV power supply is required.

IO Simulation When used with MYNAH's **MiMiC Simulation Software**, the VIM supports I/O simulation all DeltaV S-Series I/O cards including classic IO, Foundation Fieldbus, ProfibusDP, DeviceNet, ASi-bus and Serial.

MiMiC Simulation Software provide dynamic simulation for DeltaV system software acceptance testing and operator training. The MiMiC software works by simulating the DeltaV I/O. It also simulates field devices using Foundation Fieldbus, ProfibusDP, DeviceNet and AS-i buses. In order for MiMiC to do this, the real I/O cards are disconnected from the control system. The MiMiC driver writes to the I/O subsystem of the DeltaV controller. Process models in MiMiC simulate realistic process reactions to control system output signals.

Each process controller being simulated uses one MiMiC Dataset. A MiMiC server can have up to 32 datasets or ports. Each dataset can support up to 4000 MiMiC simulation tags.

The I/O simulation driver is provided with the VIM hardware, pre-loaded in the VIM. The MiMiC Simulation Software must be purchased separately from MYNAH Technologies. Technical support for the MiMiC Simulation Software and I/O simulation driver is provided by MYNAH Technologies.

Ethernet I/O Integration When used with the MYNAH **Ethernet I/O** drivers, the VIM can communicate with high-speed Ethernet networks over Modbus TCP or Ethernet/IP. When the VIM is configured with the appropriate Ethernet I/O driver, the DeltaV Controller auto-senses a commissioned VIM as four DeltaV Serial Cards.

- In simplex installations these cards will be sensed in slots 57-60 or 61-64.
- In redundant installations the redundant pairs will be sensed in slots 57 to 64.

Configuration of the I/O signals from the commissioned VIM is done in the DeltaV Explorer in the same manner as a DeltaV Serial Card.

VIMNet Explorer. The **VIMNet Explorer** utility allows the user to commission the VIM, setup primary and redundant VIMs, and the Ethernet I/O network. The user is able to specify the IP address, Subnet Mask, and Gateway of each VIM and set the node address and names of each Ethernet I/O device that is used by the VIM. The VIMNet Explorer is also used to flash upgrade a VIM from one version of a driver to another or to replace an existing driver type with another. Only one Ethernet I/O driver may be loaded in the VIM at one time.

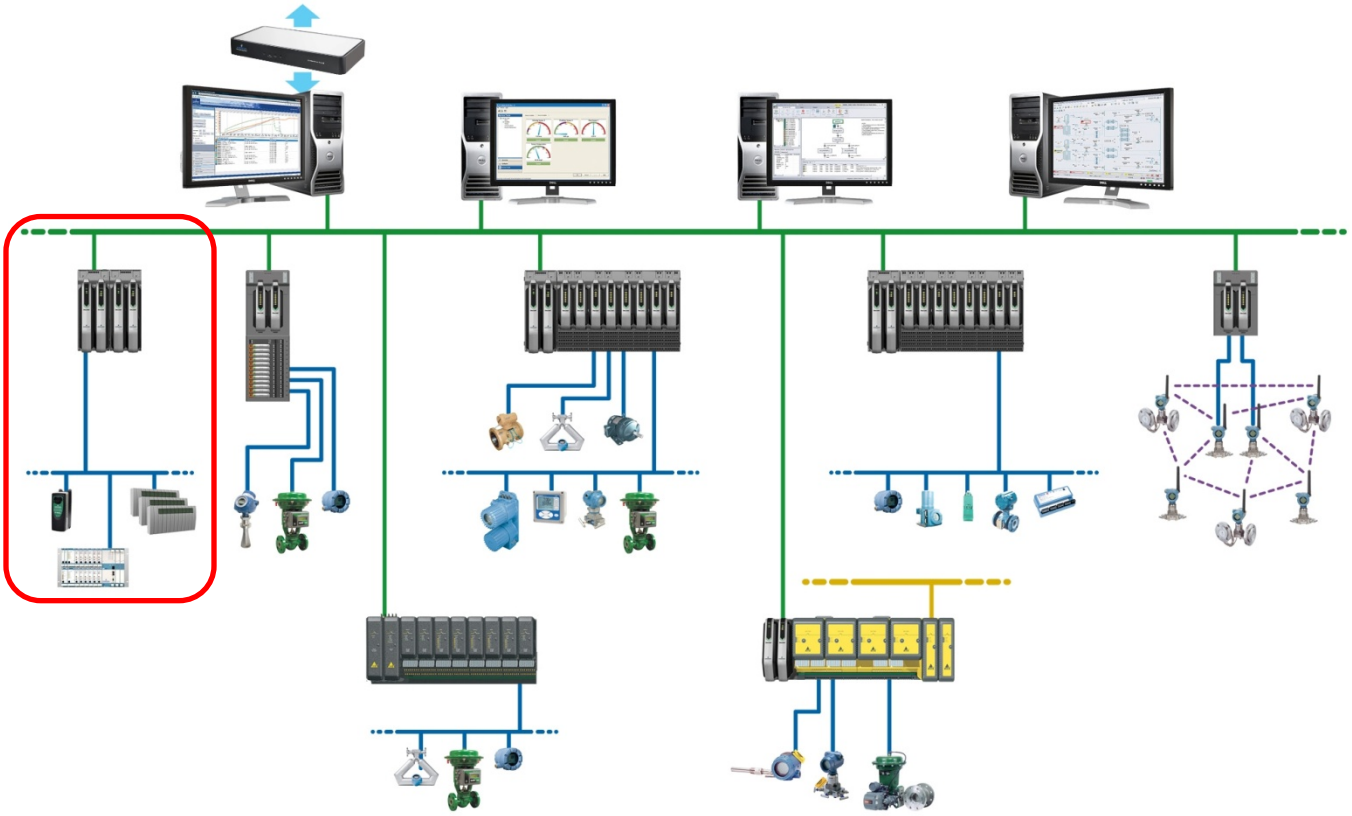
The VIMNet Explorer application must run on a workstation that has network connectivity to the Ethernet I/O network. This may be a DeltaV workstation with the 3rd network interface card (NIC) connected to the Ethernet I/O network or may be a non-DeltaV workstation. The VIMNet Explorer runs on the MS Windows XP or Windows 7 operating system and has an intuitive, graphical user interface. Connection to the VIM is done through the RJ-45 Ethernet Connection on the bottom of the VIM.

The VIMNet Explorer software installation file is available on a DeltaV v11 and later workstation and on the DeltaV v11 and later software installation DVD. The VIMNet Explorer software installation file is also provided with the purchase of a MYNAH Ethernet I/O driver.

VIM Redundancy. Two VIMs can be setup as a redundant pair for installations that require backup Ethernet I/O networks. Each VIM will be installed on its own 2-wide carrier, with its own power supply to the left of the DeltaV Controller.

The active and standby VIMs monitor each other with a continuous status command using the redundancy link cable supplied with each redundant pair. The active VIM communicates over the network to the Industrial Ethernet device and the standby sends an intermittent signal to the device to maintain communication integrity.

The Ethernet I/O drivers are not provided with the VIM hardware; they must be purchased separately from MYNAH Technologies. Technical support for the Ethernet I/O drivers is provided by MYNAH Technologies.



The DeltaV system with S-Series VIM and Ethernet I/O integration (simplex VIM and DeltaV controller shown)

Supported Industrial Ethernet Protocols

Modbus TCP/IP The VIM with the Modbus TCP/IP Master Driver supports the following Modbus communications protocol function codes to read and write values to and from a Modbus slave device, as specified by the Modbus Application Protocol Specification from Modbus-IDA.org.

The VIM Modbus TCP/IP Driver supports the following Modbus function codes:

- Code 1 - Read Coil Status
- Code 2 - Read Input Status
- Code 3 - Read Holding Registers
- Code 4 - Read Input Registers
- Code 5 - Force Single Coil
- Code 6 - Preset Single Register
- Code 8 - Diagnostic Loop Back Test
- Code 15 - Force Multiple Coils
- Code 16 - Preset Multiple Registers

The VIM can function as both a Modbus TCP/IP master and slave simultaneously. Master or slave mode is set at the virtual port level. In master-only mode, this driver can communicate with a maximum of 32 slave devices. Systems that use both master and slave mode can communicate with a maximum of 16 slaves and 16 masters at the same time. The master and slave capability is available in simplex implementations only. In redundant applications, only master mode is supported.

Ethernet/IP The VIM with the Ethernet/IP Scanner Driver provides the following compatible functions using the Control and Information Protocol (CIP) as defined in the Ethernet/IP Specification from Open DeviceNet Vendor Association and ControlNet International.

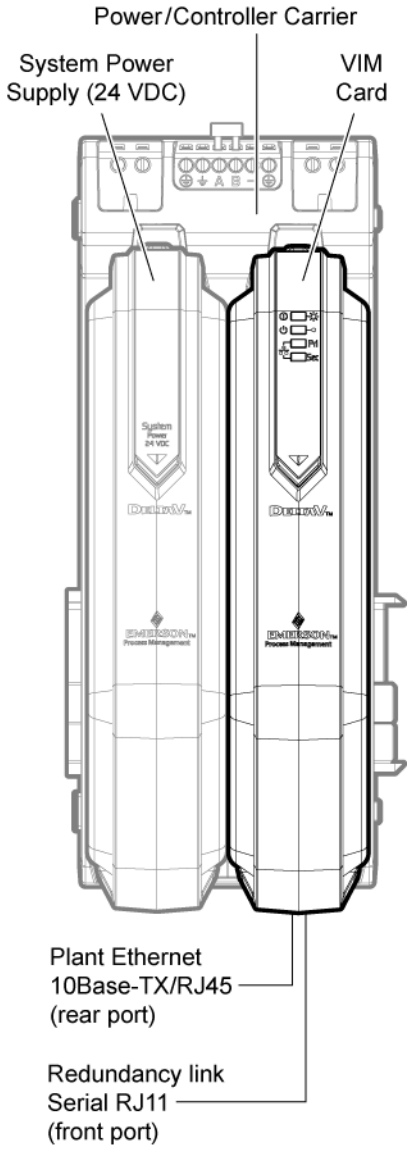
The VIM Ethernet/IP Scanner Class Driver provides:

- Ethernet/IP Scanner Class (originator) functionality
- UCMM (unconnected) messaging client and server Class 3 (connected) messaging client and server, including encapsulated DF1 message Class 1 (I/O) connection client and server

DeltaV Licensing Guidelines

DeltaV Software Licensing Requirements (DST count) will be impacted by DeltaV Module configuration use of VIM registers in the same way as Serial Card registers. The following guidelines can be applied:

- A DeltaV Serial Card data set can contain up to 100 values (a value can be any Boolean, 8-bit or 16-bit number), and up to16 data sets are supported by each of the 2 ports on the serial card. If the data set registers are configured as floating point or 32-bit values, then the maximum value is 50. However, the serial device, in general, limits the total capacity of the interface.
- Each data set counts as one DST as long as a single module references all values in the data set. If multiple modules reference values in a data set, then the DST count for the data set is equal to the number of modules referencing the data set.
- Values used in modules containing control function blocks will be counted as Control DSTs.
- Values referenced only in graphics or a history collection count as SCADA values, not DSTs.



S-Series VIM and power supply details

Hardware Specifications

Specifications for the S-series Virtual I/O Module	
Power requirement	Supplied by System Power Supply through 2-wide Power/Controller Carrier
Maximum current	750 mA at 5 VDC
Fuse protection (internal)	3.0 A, non-replaceable fuses
Power dissipation	4.0 W typical, 5.4 W maximum
User Memory	16 MB
Mounting	On right slot of power/controller carrier OR vertical carrier
Size dimensions	4.1 cm w x 15.9 cm h x 10.7 cm d
Weight	278 grams
Environmental specifications:	
Operating temperature	0° to 60° C (32° to 140° F)
Storage temperature	-40° to 85° C (-40° to 185° F)
Relative humidity	5 to 95%, non-condensing
Airborne contaminants	ISA-S71.04-1985 Airborne Contaminants Class G2
Shock (normal operating conditions)	10 g ½-sine wave for 11 ms
Vibration (operative limit)	1 mm peak-to-peak from 5 Hz to 16 Hz, 0.5 g from 16 Hz to 150 Hz
LED Indicators – On Status:	
Green – Power	Indicates DC power is applied.
Red – Error	Indicates an error condition.
Green – Active	Indicates that the VIM is commissioned and active.
Green – Standby	Not used.
Yellow flashing – Network	Indicates valid network communication.
Yellow, flashing – Ctlr IO	Indicates valid DeltaV I/O Bus communication.
All except Power flashing, alternating even and odd	Visual ID of controller initiated from user interface software by ping command
External connections:	
Plant Ethernet Network	One 10BaseT 8-pin RJ-45 connector
Redundancy Link	One RJ-11 Serial Connection (cable supplied with redundant modules)
Ethernet I/O Capacity:	
Emulated DeltaV Serial Cards	4
Data sets per VIM	128
TCP/IP Master/Slave or Adapter Nodes per VIM	Redundant mode: 16 slaves only Simplex mode: 32 slaves Simplex mode mix: 16 slaves and 16 masters

Ordering Information

Description	Model Number
S-series Virtual I/O Module	SE4023
Redundant S-series Virtual I/O Modules (Includes two VIMs and one redundancy link cable)	SE4025

MYNAH Technologies Product Ordering Information

Description	Model Number
MiMiC Simulation Software	Contact MYNAH Technologies
Modbus TCP/IP Master Driver	Contact MYNAH Technologies
Ethernet/IP Scanner Driver	Contact MYNAH Technologies
Generic Device Ethernet/IP Scanner Driver	Contact MYNAH Technologies

Related 3rd Party Products

- **VIMNet Explorer.** Used to commission and flash upgrade the VIM and to configure the Ethernet I/O network. Provided with the DeltaV v11 and later software.

  MYNAH Technologies. For more information about the MiMiC Simulation Software or Ethernet I/O drivers, please contact MYNAH at:

  MYNAH Technologies
  504 Trade Center Blvd.
  Chesterfield, Missouri 63005 USA
  +1.636.728.2000
  Email: support@MYNAH.com
  http://www.MYNAH.com

Prerequisites

One power controller carrier per VIM. Please refer to the S-series Horizontal Carriers product data sheet for details.

One dedicated system power supply per VIM. Please refer to the S-series Power Supplies product data sheet for details.

To use for I/O Simulation with MYNAH's MiMiC Simulation Software, a MiMiC base license and DeltaV Railbus Driver Pack must be purchased from MYNAH. Technical support for the MiMiC Simulation Software and I/O simulation driver is provided by MYNAH.

To use for Ethernet I/O integration, an Ethernet I/O driver must be purchased from MYNAH. Technical support for the Ethernet I/O drivers is provided by MYNAH.

DeltaV v11 or later software.

To locate a sales office near you, visit our website at:
www.EmersonProcess.com/DeltaV
Or call us at:
Asia Pacific: 65.6777.8211
Europe, Middle East: 41.41.768.6111
North America, Latin America: +1 800.833.8314 or +1 512.832.3774

For large power, water, and wastewater applications contact Power and Water Solutions at:
www.EmersonProcess-powerwater.com
Or call us at:
Asia Pacific: 65.6777.8211
Europe, Middle East, Africa: 48.22.630.2443
North America, Latin America: +1 412.963.4000