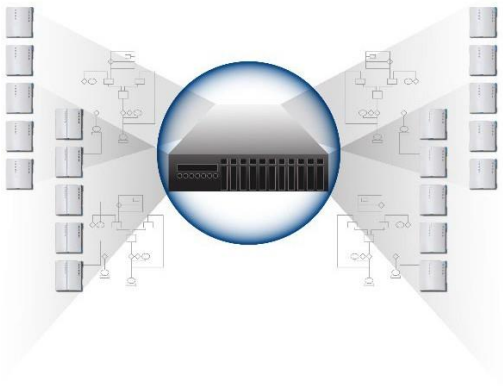
Ovation™ Software-Defined Controller (SDC100)

Features

- Loaded as a virtual machine on a Type 1 hypervisor providing configurable hardware parameters
- Can load multiple SDCs on a single host, decreasing the hardware footprint needed
- A “SCADA-like” solution that provides Ethernet I/O data acquisition with the ability to perform typical control all in one Controller
- Embedded Communication Protocol Suite (CPS) provided to communicate to various Ethernet-based devices without the need for extra hardware
- Controller redundancy support
- Uses standard Ovation engineering tools for configuration and maintenance



Introduction

Emerson’s Ovation™ distributed control system is renowned for delivering precision control with outstanding performance. That precision begins with the Ovation Controller.

The Software-Defined Controller (SDC) is a VxWorks virtual machine in a hypervisor environment. The SDC minimizes hardware requirements and footprint by allowing users to load multiple SDC’s on a single server.

Server specification requirements are flexible and can scale up and down based on the plant’s needs. This allows users to manage costs effectively by customizing their Ovation system to include only the hardware necessary to run their operation.

The Communication Protocol Suite (CPS), built into the SDC, enables a direct interface to third-party I/O or other devices, such as programmable logic controllers (PLCs), programmable automation controllers (PACs), and real-time automation controllers (RTACs), without the need for extra hardware.

Process Applications

The SDC is configured with enough memory and CPU resources to perform the same task speeds and loads as an OCR3000 Controller. The minimum requirements for each SDC are one virtual CPU, one GB of memory, and one GB of virtual disk. These specifications can be flexible in the sense of how much fast control logic the user can load.

Users can utilize additional virtual processors by project engineering on more heavily loaded applications.

The SDC is designed to meet the demanding requirements of a broad range of process applications. Functions performed by this scalable Controller include:

- Continuous (PID) control
- Sequential function chart control
- Boolean logic
- Advanced control
- Special logic and timing functions
- Data acquisition
- Process point alarm processing
- Process point conversion to engineering units
- Process point database storage
- Process point tagout

Standard Functions

The Software-Defined Controller performs the following standard functions.

Control Execution

Like the Ovation OCR3000 Controller model, the SDC executes simple to complex modulating, discrete, and sequential control strategies, and performs data acquisition and monitoring functions. The Controller can originate a maximum of 64,000 points.

The SDC simultaneously executes up to five process control tasks at loop speeds ranging from 10 milliseconds to 300 seconds. Each control task loop is comprised of the I/O process point input scan, control scheme execution, and an output scan. All five control tasks have user-selectable loop speeds.

Control Scheme

SDC functionality is defined by control sheets created from an extensive library of standard and advanced Ovation algorithms specifically designed for the power, water, and wastewater industries. Control sheets provide the basis for the execution, documentation, and automatic creation of control tuning diagrams used during commissioning and control schemes adjustments. On average, the SDC can execute more than 1,000 control sheets.

Alarm Processing

The SDC processes limits and alarms based on each process point's database definition. These functions perform regardless of whether the point is scanned for input to a control loop or for data acquisition/monitoring, separate from control functions. Each scan updates the alarm status of each point in the Controller. The status may indicate whether a point value has:

- Exceeded the range of the sensor
- Exceeded the user-defined limits
- Changed state (discrete points)
- Passed an incremental limit

Redundancy

The SDC supports a full range of configurations from small-scale simplex, non-redundant layouts to full redundancy of control processors, communications network equipment, and hosts. The simplest install of the SDC consists of a simplex controller loaded on a host. The most robust form of redundancy consists of a primary SDC loaded on a primary host and a backup SDC loaded on a secondary host with a dedicated network connection between the two.

Real-Time Operating System Functions

The SDC processes data for real-time control and communication functions using a commercially available, multitasking, real-time operating system. It executes and coordinates the control of multiple application areas by using multi-tasking with pre-emptive priority scheduling.

The real-time operating system communicates with the Ovation network and other systems through TCP/IP-based protocols, provides basic routing functions, and offers general resource management within the Controller.

Connectivity

The SDC includes embedded Ethernet link protocol drivers for communicating with intelligent electronic devices (IEDs) and other third-party devices equipped with embedded Controllers such as smart inverters, weather stations, protective relaying systems, or motor control centers.

The scalable Controller performs data acquisition functions by communicating with Ethernet-capable I/O systems available from numerous vendors and various types of PLCs, PACs, and RTACs using the onboard communication protocol drivers.

The SDC can acquire smart field device information for archiving to the Ovation Process Historian, displaying on a workstation connected to the Ovation network, or for use with asset management functions through Emerson's AMS Suite technologies or Ovation Machine Works software.

Specifications

The SDC is a server-based Controller and runs as a virtual machine within a Type 1 Hypervisor environment. Solutions using the SDC only require an HMI for simplex installations. The SDC is not itself a standalone controller, so for typical installations, it is part of a complete Ovation system with a database server. The user can load the database server as a virtual machine on the hypervisor or as its own separate HMI.

Ovation Software-Defined Controller Specifications	
Hypervisor	▪ Type 1 Hypervisor ▪ VMWare ESXi (Currently this is the only hypervisor supported) ▪ VMWare ESXi version 7.0 update 3 or higher
ESXi Host Hardware (minimum requirements)	▪ Intel-based CPU ▪ Supported server platform ▪ 2 CPU cores ▪ 8 GB physical RAM ▪ 1 fast ethernet NIC Users can increase the above specifications for a host to handle more virtual machines (either SDCs or workstations). Ensure the minimum hardware and system resources are met for the version of ESXi used at docs.vmware.com.
SDC Virtual Hardware (minimum requirements)	▪ 1 virtual CPU ▪ 1 GB memory ▪ 1 GB virtual disk ▪ 1 virtual NIC ▪ 1 virtual CD/DVD Drive
Supported CPS Protocols	▪ Allen-Bradley CSP/PCCC Client ▪ Allen-Bradley DF1 Client ▪ Allen-Bradley EIP/PCCC Client ▪ Building Automation Controls network (BACnet) Server ▪ Building Automation Controls network (BACnet) Client ▪ Clipper Client ▪ DNP3 Server ▪ DNP3 Client ▪ EIP Explicit Server ▪ EIP Implicit I/O Server ▪ EIP Implicit I/O Client ▪ GE Mark GSM Client ▪ Inter-Control Center Communications Protocol (ICCP) Server ▪ Inter-Control Center Communications Protocol (ICCP) Client

Ovation Software-Defined Controller Specifications	
	▪ IEC 61850 MMS Client ▪ IEC 60870-5-101 Controlling/ IEC 60870-5-101 Controlled ▪ IEC 60870-5-103 Controlling/ IEC 60870-5-103 Controlled ▪ IEC 60870-5-104 Controlling/ IEC 60870-5-104 Controlled ▪ IEC 61850 GOOSE ▪ LoggerNet PC Client ▪ Modbus Server ▪ Modbus Client ▪ Openness, Productivity, and Connectivity Unified Architecture (OPC UA) Server ▪ Openness, Productivity, and Connectivity Unified Architecture (OPC UA) Client ▪ Optomux Client ▪ Siemens S7 ▪ Turbine Control Interface Client ▪ Winteligence Server