Recommended Computing Resources for Cisco Catalyst SD-WAN Control Components Release 20.10.x

Note To achieve simplification and consistency, the Cisco SD-WAN solution has been rebranded as Cisco Catalyst SD-WAN. In addition, from Cisco IOS XE SD-WAN Release 17.12.1a and Cisco Catalyst SD-WAN Release 20.12.1, the following component changes are applicable: **Cisco vManage** to **Cisco Catalyst SD-WAN Manager**, **Cisco vAnalytics** to **Cisco Catalyst SD-WAN Analytics**, **Cisco vBond** to **Cisco Catalyst SD-WAN Validator**, **Cisco vSmart** to **Cisco Catalyst SD-WAN Controller**, and **Cisco Controllers** to **Cisco Catalyst SD-WAN Control Components**. See the latest Release Notes for a comprehensive list of all the component brand name changes. While we transition to the new names, some inconsistencies might be present in the documentation set because of a phased approach to the user interface updates of the software product.

Note Starting from Cisco Catalyst SD-WAN Control Components Release 20.9.x, the recommended computing resources are specified for single tenant and multitenants according to the instance type definitions. Prior to Cisco Catalyst SD-WAN Control Components Release 20.9.x, the recommended computing resources were specified based the deployment modes.

Single Tenant (ST)

The supported instance specifications for the Cisco vManage, Cisco vBond Orchestrators, and Cisco vSmart Controllers are as follows:

Note The controller and the device software versions should be the same, to achieve the following scale.

Table 1: Instance Type Definitions

Instance Type	Specifications (Approximation)			Qualified Instance Type	
	vCPUs*	RAM*	Storage Size*	Azure	AWS
Small	16 vCPUs	32 GB RAM	500 GB	Standard_F16s_v2	c5.4xlarge
Medium	32 vCPUs	64 GB RAM	1 TB	Standard_F32s_v2	c5.9xlarge
Large	32 vCPUs	128 GB RAM	5 TB	Standard_D32ds_v5	c5.18xlarge

* vCPU, RAM, and Storage Size numbers are on per Cisco vManage basis. The Storage Size numbers can be sized up to 10 TB for on-prem and customer cloud hosted.

Table 2: Instance Types with Number of Devices, Nodes and Deployment Models

Devices	Nodes and Deployment Models with Instance Type	Data Processing Factor	Number of days the data can be stored	Max Daily Processing Volume	Cisco Cloud	On-Prem (UCS)	Customer Cloud
Cisco SD-WAN Application Intelligence Engine (SAIE) Disabled							
<250	One Node Small Cisco vManage	NA	NA	NA	Yes	Yes	Yes
250-1000	One Node Medium vManage	NA	NA	NA	Yes	Yes	Yes
1000-1500	One Node Large vManage	NA	NA	NA	Yes	Yes	Yes
1500-2000	Three Node Medium vManage Cluster (All Services)	NA	NA	NA	Yes	Yes	Yes
2000-5000	Three Node Large vManage Cluster (All Services)	NA	NA	NA	Yes	Yes	Yes

Devices	Nodes and Deployment Models with Instance Type	Data Processing Factor	Number of days the data can be stored	Max Daily Processing Volume	Cisco Cloud	On-Prem (UCS)	Customer Cloud
5000-10000	Six Node Large vManage Cluster (3 Nodes with ConfigDB) and all nodes messaging server, stats and AppServer	NA	NA	NA	Yes	Yes	Yes
Cisco SD-WAN Application Intelligence Engine (SAIE**) Enabled							
<250	One Node Medium vManage	25 GB/Day	20 Days	25 GB/Day	Yes	NA	NA
<250	One Node Large vManage	50 GB/Day	30 Days	50 GB/Day	NA	Yes	Yes
250-1000	One Node Large vManage	50 GB/Day	30 Days	50 GB/Day	Yes	Yes	Yes
1000-4000	Three Node Large vManage Cluster (All Services)	100 GB/Day	14 Days	300 GB/Day	Yes	Yes	Yes
4000-7000	Six Node Large vManage Cluster (3 Node with ConfigDB) and all nodes messaging server, stats, and AppServer	100 GB/Day	14 Days	2 TB/Day*	Yes	Yes	Yes

Devices	Nodes and Deployment Models with Instance Type	Data Processing Factor	Number of days the data can be stored	Max Daily Processing Volume	Cisco Cloud	On-Prem (UCS)	Customer Cloud
7000-10000	Six Node Large vManage Cluster (3 Node with ConfigDB) and all nodes messaging server, stats, and AppServer	100 GB/Day	14 Days	1 TB/Day*	Yes	Yes	Yes

Note

- *For a larger dataset per day, run Stats on all the servers.
- ** Along with the SAIE, the following statistics are also considered in the recommendations:
  - Approute
  - Performance Monitor

Table 3: Supported Scale on Cisco HyperFlex (HX), SAIE Disabled

Devices	Nodes and Deployment Models with Instance Types
0-2000	Three Node Medium Cisco vManage Cluster
2000-5000	Three Node Large Cisco vManage Cluster

To achieve scale beyond the numbers mentioned in the tables above, deploy multiple overlays.

Note

- The number of days the data can be stored in Cisco SD-WAN Manager, depends on per-day processing volume of the device nodes. To store the data for a longer time or to accommodate the increase in per-day processing volume, use the following formulas to calculate the required Cisco SD-WAN Manager disk size:
- Formula to calculate the Cisco SD-WAN Manager disk size required for single node deployment: (Data per day × number of days) + 500 GB buffer. For example, if the data per day is 100 Gigabytes and the number of days the data must be stored is 10, then the required Cisco SD-WAN Manager disk size is 1.5 Terabytes.
- Formula to calculate the Cisco SD-WAN Manager disk size required for cluster deployment: (Data per day × number of days × 3) + 500 GB buffer. For example, if the data per day is 100 Gigabytes, the number of days the data must be stored is 10, then the required Cisco SD-WAN Manager disk size is 3.5 Terabytes.

Note Maximum tested disk size for On-prem is 10 TB per instance.

Note Starting from Cisco vManage Release 20.6.1, you can achieve the above mentioned storage size numbers by modifying the aggregated SAIE size. The aggregated SAIE size is unidimensional and varies when the deployment includes edge devices that run on a mix of releases (Cisco SD-WAN Release 20.6.x and earlier releases). The aggregated SAIE also varies when on-demand troubleshooting is enabled for the devices.

Ensure that both the SAIE and aggregated SAIE index sizes are configured to enable on-demand troubleshooting.

To modify the aggregated SAIE value,

1. From the **Cisco SD-WAN Manager** menu, choose **Administration** > **Settings**.
2. Click **Edit** next to **Statistics Database Configuration**.
3. Modify the **Aggregated SAIE** size to the desired value based on your SAIE traffic, the default disk size allocation is 5 GB.

Note When SAIE is enabled, you must set the Statistics Collection timer to 30 minutes or higher.

To set the Statistics Collection timer,

1. From the **Cisco SD-WAN Manager** menu, choose **Administration** > **Settings**.
2. Click **Edit** next to **Statistics Configuration**.
3. Modify the **Collection Interval** minutes to the desired value based on your SAIE traffic, the default collection interval is 30 minutes.
4. Click **Save**.

Table 4: Cisco SD-WAN Validator Recommended Computing Resources

Devices	Number of Cisco SD-WAN Validators	vCPU	RAM	OS Volume	vNICs	Azure	AWS
<1000	2	2	4 GB	10 GB	2 (one for tunnel interface, one for management)	Standard_F2s_v2	c5.large
1000-4000	2	4	8 GB	10 GB	2 (one for tunnel interface, one for management)	Standard_F4s_v2	c5.xlarge
4000-8000	4	4	8 GB	10 GB	2 (one for tunnel interface, one for management)	Standard_F4s_v2	c5.xlarge
8000-10000	6	4	8 GB	10 GB	2 (one for tunnel interface, one for management)	Standard_F4s_v2	c5.xlarge

Table 5: Cisco Catalyst SD-WAN Controllers Recommended Computing Resources

Devices	Number of Cisco Catalyst SD-WAN Controllers	vCPU	RAM	OS Volume	vNICs	Azure	AWS
<250	2	4	8 GB	10 GB	2 (one for tunnel interface, one for management)	Standard_F4s_v2	c5.xlarge
250-1000	2	4	16 GB	10 GB	2 (one for tunnel interface, one for management)	Standard_D4ds_v5	c5.2xlarge

Devices	Number of Cisco Catalyst SD-WAN Controllers	vCPU	RAM	OS Volume	vNICs	Azure	AWS
1000-2500	2	8	16 GB	10 GB	2 (one for tunnel interface, one for management)	Standard_F8s_v2	c5.2xlarge
2500-5000	4	8	16 GB	10 GB	2 (one for tunnel interface, one for management)	Standard_F8_v2	c5.2xlarge
5000-7500	6	8	16 GB	10 GB	2 (one for tunnel interface, one for management)	Standard_F8_v2	c5.2xlarge
7500-10000	8	8	16 GB	10 GB	2 (one for tunnel interface, one for management)	Standard_F8_v2	c5.2xlarge

Note

- The tested and recommended limit of supported Cisco SD-WAN Validator instances in a single Cisco Catalyst SD-WAN overlay are eight, similarly the maximum number of tested Cisco SD-WAN Controller instances is twelve.
- The required number of vCPUs and RAM for Cisco SD-WAN Validator and Cisco SD-WAN Controller for Cisco Cloud Hosted overlays are determined by the Cisco Cloud Ops and provisioned accordingly.
- The number of Cisco SD-WAN Validator and Cisco SD-WAN Controller instances recommended in the table above assumes a deployment with Cisco SD-WAN Control Components in two locations (i.e. data centers) designed for redundancy – with half the controllers in one data center and half the controllers in another data center. In other words, the table above already considers the 1:1 redundancy in the number of Cisco SD-WAN Validator and Cisco SD-WAN Controller instances recommended to be deployed across the two data centers – without considering any Cisco vSmart controller group/affinity configuration.

  If you are deploying Cisco SD-WAN Validator and Cisco SD-WAN Controller instances with a different set of assumptions, for example, across three data centers, or if you are using Cisco SD-WAN Validator groups/affinity within your deployment, refer to the Points to Consider chapter for additional guidance.

Table 6: Testbed Specifications for UCS Platforms

Hardware SKU	Specifications
UCSC-C240-M5SX	UCS C240 M5 24 SFF + 2 rear drives without CPU, memory cards, hard disk, PCIe, and PS.
UCS-MR-X16G1RT-H	16GB DDR4-2933-MHz RDIMM/1Rx4/1.2v
UCS-CPU-I6248R	Intel 6248R 3GHz/205W 24C/35.75MB DDR4 2933MHz
UCS-SD16T123X-EP	1.6TB 2.5in Enterprise Performance 12G SAS SSD (3X endurance)

Note

- Any UCS Platform (Fifth generation and above) with the same or higher hardware specifications mentioned in the above table supports Cisco SD-WAN Controllers with similar scale numbers mentioned in this document.
- The CPU specifications are not tied to any brand, both AMD and Intel brands with specifications above are supported.

Table 7: Testbed Specifications for HX Platforms

Hardware SKU	Specifications
HXAF240-M5SX	Cisco HyperFlex HX240c M5 All Flash Node
HX-MR-X32G2RT-H	32GB DDR4-2933-MHz RDIMM/2Rx4/1.2v
HX-CPU-I6248	Intel 6248 2.5GHz/150W 20C/24.75MB 3DX DDR4 2933 MHz
HX-SD38T61X-EV	3.8TB 2.5 inch Enterprise Value 6G SATA SSD
HX-NVMEXPB-I375	375GB 2.5 inch Intel Optane NVMe Extreme Performance SSD

Note

- The tested replication factor is three.
- The default compression on the HX system is applicable to all cases. This compression is automatically determined by the system and cannot be configured.

Multitenant (MT)

The supported instance specifications for the Cisco vManage, Cisco vBond Orchestrators, and Cisco vSmart Controllers are as follows:

Table 8: Instance Type Definitions

Instance Type	Specifications (Approximation)			Qualified Instance Type	
	vCPUs	RAM	Storage Size	Azure	AWS
Large	32 vCPUs*	128 GB RAM	5 TB	Standard_F64s_v2	c5.18xlarge

* requires 64 vCPU for multi-tenant deployment in the Cisco vManage Specifications table for deploying beyond 2500 devices.

Table 9: Cisco vManage Specifications

Max Tenants (T) and Devices (D)	Nodes and Deployment Models with Instances Type	Data Processing Factor	Number of Days the Data Can be Stored	Cisco Cloud	On-Prem (UCS)	Customer Cloud
75(T) and 2500(D)*	Three Node Large vManage	100 GB/Day	14 Days	Yes	Yes	Yes
150(T) and 7500(D)*	Six Node Large vManage (64 vCPUs required)	100 GB/Day	14 Days	No	Yes	Yes

Note * indicates that a pair of Cisco vSmart Controllers supports 24 tenants and 1000 devices across all the tenants.

Table 10: Cisco vBond Orchestrators Recommended Computing Resources

Devices	Number of Cisco vBond	vCPU	RAM	OS Volume	vNICs	AWS	Azure
<1000	2	2	4 GB	10 GB	2 (one for tunnel interface, one for management)	c5.large	Standard_F2s_v2
1000-4000	2	4	8 GB	10 GB	2 (one for tunnel interface, one for management)	c5.xlarge	Standard_F4s_v2

Devices	Number of Cisco vBond	vCPU	RAM	OS Volume	vNICs	AWS	Azure
4000-7500	4	4	8 GB	10 GB	2 (one for tunnel interface, one for management)	c5.xlarge	Standard_F4s_v2

Table 11: Cisco vSmart Controllers Recommended Computing Resources

Devices	vCPU	RAM	OS Volume	vNICs	AWS	Azure
< 250	4	8 GB	10 GB	2 (one for tunnel interface, one for management)	c5.xlarge	Standard_F4s_v2
250-2500	8	16 GB	10 GB	2 (one for tunnel interface, one for management)	c5.2xlarge	Standard_F8_v2
2500-5000	8	16 GB	10 GB	2 (one for tunnel interface, one for management)	c5.2xlarge	Standard_F8_v2
5000-7500	8	16 GB	10 GB	2 (one for tunnel interface, one for management)	c5.2xlarge	Standard_F8_v2

Table 12: Cisco vBond and vSmart Specifications

Devices	Number of Cisco vBond Orchestrators Required	Number of Cisco vSmart Controllers Required
75 Tenants or 2500 Devices	2	A pair for every 24 tenants
150 Tenants or 7500 Devices	2 (additional 2 if deployment goes beyond 4000 devices)	A pair for every 24 tenants

Note

- A pair of Cisco vSmart Controllers supports 24 tenants and 1000 devices across all the tenants. For example, 24 tenants require 2 vSmart Controllers, 50 tenants require 6 vSmart Controllers, and 150 tenants require 14 vSmart Controllers.
- The SAIE numbers are for the entire multi-tenant (cluster) deployment and there is no per tenant SAIE limitation.
- If SAIE is enabled, we recommend that the aggregated SAIE data (across all Cisco vManage nodes and all tenants in the multitenant system) does not exceed 350 GB per day. If the SAIE data exceeds 350 GB per day, increase the Hard Disk capacity of each Cisco vManage node up to 10 TB.
- A pair of Cisco vSmart Controllers supports 24 tenants and 1000 devices across all tenants.
- A tenant can add a maximum of 1000 devices.
- The tested and recommended limit of supported Cisco vBond Orchestrator instances in a single Cisco SD-WAN overlay is eight.