Recommended Computing Resources for Cisco Catalyst SD-WAN Control Components Release 20.15.x

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), on page 1
- Multitenant (MT), on page 12

Single Tenant (ST)

The supported instance specifications for the Cisco SD-WAN Manager, Cisco SD-WAN Validator, and Cisco SD-WAN Controller are as follows:

Note
- The control components 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

Instance Type	Specifications (Approximation)			Qualified Instance Type	
	vCPUs*	RAM*	Storage Size*	Azure	AWS
Large	32 vCPUs	128 GB RAM	5 TB	Standard_D32ds_v5	c5.18xlarge and m6i.8xlarge**

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

** This instance can be deployed on c5.18xlarge and m6i.8xlarge. However, we recommend using the m6i.8xlarge instance type for this deployment.

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	DR Supported ***	Cisco Cloud	On-Prem (UCS - ESXi/KVM)	On-Prem (UCS - Nutanix)****	Customer Cloud
**** Cisco Catalyst SD-WAN Application Intelligence Engine (SAIE) Disabled**									
<250	One Node Small Cisco Cisco SD-WAN Manager	NA	NA	NA	No	Yes	Yes	No	Yes
<1000	One Node Large Cisco SD-WAN Manager	NA	NA	NA	Yes	Yes	Yes	Yes	Yes
1000-1500	One Node Large Cisco SD-WAN Manager	NA	NA	NA	Yes	Yes	Yes	No	Yes

Devices	Nodes and Deployment Models with Instance Type	Data Processing Factor	Number of days the data can be stored	Max Daily Processing Volume	DR Supported ***	Cisco Cloud	On-Prem (UCS - ESXi/KVM)	On-Prem (UCS - Nutanix)****	Customer Cloud
**** Cisco Catalyst SD-WAN Application Intelligence Engine (SAIE) Disabled**									
1500-2000	Three Node Medium Cisco SD-WAN Manager Cluster (All Services)	NA	NA	NA	No	Yes	Yes	No	Yes
1000-2500	Three Node Large Cisco SD-WAN Manager Cluster (All Services)	NA	NA	NA	Yes	Yes	Yes	Yes	Yes
2000-5000	Three Node Large Cisco SD-WAN Manager Cluster (All Services)	NA	NA	NA	Yes	Yes	Yes	No	Yes

Devices	Nodes and Deployment Models with Instance Type	Data Processing Factor	Number of days the data can be stored	Max Daily Processing Volume	DR Supported ***	Cisco Cloud	On-Prem (UCS - ESXi/KVM)	On-Prem (UCS - Nutanix)****	Customer Cloud
**** Cisco Catalyst SD-WAN Application Intelligence Engine (SAIE) Disabled**									
2000-5000	Six Node Large Cisco SD-WAN Manager Cluster (3 Nodes with ConfigDB) and all nodes messaging server, stats and AppServer	NA	NA	NA	Yes	Yes	Yes	No	Yes
5000-12500	Six Node Large Cisco SD-WAN Manager Cluster (3 Nodes with ConfigDB) and all nodes messaging server, stats and AppServer	NA	NA	NA	Yes	Yes	Yes	No	Yes
** Cisco Catalyst SD-WAN Application Intelligence Engine (SAIE) Enabled									
<250	One Node Medium Cisco SD-WAN Manager	25 GB/Day	20 Days	25 GB/Day	No	Yes	NA	NA	NA

Devices	Nodes and Deployment Models with Instance Type	Data Processing Factor	Number of days the data can be stored	Max Daily Processing Volume	DR Supported ***	Cisco Cloud	On-Prem (UCS - ESXi/KVM)	On-Prem (UCS - Nutanix)****	Customer Cloud
**** Cisco Catalyst SD-WAN Application Intelligence Engine (SAIE) Disabled**									
<250	One Node Large Cisco SD-WAN Manager	50 GB/Day	30 Days	50 GB/Day	Yes	NA	Yes	Yes	Yes
250-1000	One Node Large Cisco SD-WAN Manager	50 GB/Day	30 Days	50 GB/Day	Yes	Yes	Yes	Yes	Yes
1000-2500	Three Node Large Cisco SD-WAN Manager Cluster (All Services)	100 GB/Day	14 Days	300 GB/Day	Yes	Yes	Yes	Yes	Yes
2500-4000	Three Node Large Cisco SD-WAN Manager Cluster (All Services)	100 GB/Day	14 Days	300 GB/Day	Yes	Yes	Yes	No	Yes

Devices	Nodes and Deployment Models with Instance Type	Data Processing Factor	Number of days the data can be stored	Max Daily Processing Volume	DR Supported ***	Cisco Cloud	On-Prem (UCS - ESXi/KVM)	On-Prem (UCS - Nutanix)****	Customer Cloud
**** Cisco Catalyst SD-WAN Application Intelligence Engine (SAIE) Disabled**									
2500-5000	Six Node Large Cisco SD-WAN Manager Cluster (3 Node with ConfigDB) and all nodes messaging server, stats, and AppServer	100 GB/Day	14 Days	500 GB/Day	Yes	Yes	Yes	No	Yes
4000-7000	Six Node Large Cisco SD-WAN Manager Cluster (3 Node with ConfigDB) and all nodes messaging server, stats, and AppServer	100 GB/Day	14 Days	2 TB/Day*	Yes	Yes	Yes	No	Yes

Devices	Nodes and Deployment Models with Instance Type	Data Processing Factor	Number of days the data can be stored	Max Daily Processing Volume	DR Supported ***	Cisco Cloud	On-Prem (UCS - ESXi/KVM)	On-Prem (UCS - Nutanix)****	Customer Cloud
**** Cisco Catalyst SD-WAN Application Intelligence Engine (SAIE) Disabled**									
7000-12500	Six Node Large Cisco SD-WAN Manager Cluster (3 Node with ConfigDB) and all nodes messaging server, stats, and AppServer	100 GB/Day	14 Days	1 TB/Day*	Yes	Yes	Yes	No	Yes

Note

- *For a larger dataset per day, run Stats on all the servers.
- ** Along with SAIE, the following statistics are also considered in the recommendations:
  - Approute
  - Performance Monitor
- *** Consider the following points when choosing deployment models for Disaster Recovery:
  - Ensure the data center to disaster recovery (DC-DR) link has a minimum bandwidth of 1 Gigabit.
  - The latency between data centers should be 50 milliseconds (ms) or lower to ensure optimal performance.
- ****Nutanix:
  - We recommended operating each UCS server as an independent, single-node Nutanix cluster with dedicated compute, storage, and management.
  - If using a Nutanix cluster deployment, you must pin VMs must to specific UCS servers using strictly enforced VM affinity policies to ensure each VM consumes only the compute and storage resources of its assigned host.

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

Devices	Nodes and Deployment Models with Instance Types
0-2000	Three Node Medium Cisco SD-WAN Manager Cluster
2000-5000	Three Node Large Cisco SD-WAN Manager 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 Catalyst 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 Catalyst SD-WAN Manager disk size:
- Formula to calculate the Cisco Catalyst SD-WAN Manager disk size required for single node and cluster deployments: (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 Catalyst SD-WAN Manager disk size is 1.5 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 Catalyst 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
8000-12500	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 Controller Recommended Computing Resources

Devices	Number of Cisco 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
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_F8s_v2	c5.2xlarge
5000-7500	6	8	16 GB	10 GB	2 (one for tunnel interface, one for management)	Standard_F8s_v2	c5.2xlarge
7500-10000	8	8	16 GB	10 GB	2 (one for tunnel interface, one for management)	Standard_F8s_v2	c5.2xlarge
10000-12500	10	8	16 GB	10 GB	2 (one for tunnel interface, one for management)	Standard_F8s_v2	c5.2xlarge

Note

- This image can be deployed on standard F8_v2; however, standard F8s_v2 is the recommended instance type.
- The tested and recommended limit of supported Cisco Catalyst 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 Catalyst SD-WAN Validator and Cisco Catalyst SD-WAN Controller devices for Cisco Cloud Hosted overlays are determined by the Cisco Cloud Ops and provisioned accordingly.
- The number of Cisco Catalyst SD-WAN Controller and Cisco Catalyst SD-WAN Validator instances recommended in the table above assumes a deployment with Cisco Catalyst SD-WAN controllers 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 Catalyst SD-WAN Controller and Cisco Catalyst SD-WAN Validator instances recommended to be deployed across the two data centers – without considering any Cisco Catalyst SD-WAN Controller group/affinity configuration.

  If you are deploying Cisco Catalyst SD-WAN Controller and Cisco Catalyst SD-WAN Validator instances with a different set of assumptions, for example, across three data centers, or if you are using Cisco Catalyst SD-WAN Controller controller 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 Intel(R) Xeon(R) Gold 6330N CPU @ 2.20GHz
UCS-SD16T123X-EP	1.6TB 2.5in Enterprise Performance 12G SAS SSD (3X endurance)

Note

- Any UCS Platform (Fifth generation and sixth generation above) with the same or higher hardware specifications mentioned in the above table supports Cisco Catalyst 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 SD-WAN Manager, Cisco SD-WAN Validator, and Cisco SD-WAN Controller 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 and m6i.8xlarge**

* requires 64 vCPU for multi-tenant deployment in the Cisco Catalyst SD-WAN Manager Specifications table for deploying beyond 2500 devices.

** This instance can be deployed on c5.18xlarge and m6i.8xlarge. However, we recommend using the m6i.8xlarge instance type for this deployment.

Table 9: Cisco Catalyst SD-WAN Manager 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	DR Supported	Cisco Cloud	On-Prem (UCS)	Customer Cloud
24 (T) and 1000(D)*	One Node Large Cisco SD-WAN Manager	50 GB/Day	14 Days	Yes	Yes	Yes	Yes
75(T) and 2500(D)*	Three Node Large Cisco SD-WAN Manager	100 GB/Day	14 Days	Yes	Yes	Yes	Yes
150(T) and 5000(D)*	Six Node Large Cisco SD-WAN Manager (64 vCPUs required)	100 GB/Day	14 Days	Yes	No	Yes	Yes
150(T) and 7500D)*	Six Node Large Cisco SD-WAN Manager (64 vCPUs required)	100 GB/Day	14 Days	Yes	No	Yes	Yes

Table 10: Cisco Catalyst SD-WAN Validator Recommended Computing Resources

Devices	Number of Cisco Catalyst SD-WAN Validator	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 Catalyst SD-WAN Validator	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 Catalyst SD-WAN Controller 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_F8s_v2
2500-5000	8	16 GB	10 GB	2 (one for tunnel interface, one for management)	c5.2xlarge	Standard_F8s_v2
5000-7500	8	16 GB	10 GB	2 (one for tunnel interface, one for management)	c5.2xlarge	Standard_F8s_v2

Note This image can be deployed on standard F8_v2; however, standard F8s_v2 is the recommended instance type.

Table 12: Cisco Catalyst SD-WAN Validator and Cisco Catalyst SD-WAN Controller Specifications

Devices	Number of Cisco Catalyst SD-WAN Validator Required	Number of Cisco Catalyst SD-WAN Controller Required
24 Tenants or 1000 Devices	2	A pair for every 24 tenants
75 Tenants or 2500 Devices	2	A pair for every 24 tenants

Devices	Number of Cisco Catalyst SD-WAN Validator Required	Number of Cisco Catalyst SD-WAN Controller Required
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 SD-WAN Controller supports 24 tenants and 1000 devices across all the tenants. For example, 24 tenants require 2 Cisco SD-WAN Controllers, 50 tenants require 6 Cisco SD-WAN Controllers, and 150 tenants require 14 Cisco SD-WAN 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 SD-WAN Manager 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 SD-WAN Manager node up to 10 TB.
- A pair of Cisco SD-WAN 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 SD-WAN Validator instances in a single Cisco SD-WAN Manager fabric is eight.