



# Installation Overview

SD-AVC operates in a service/agent configuration. For details, see [SD-AVC Architecture](#).

- **Network Service:** The SD-AVC network service is installed as a virtualized component on a Cisco device service container, and operates on the device as a service. See: [System Requirements: SD-AVC Network Service Host, on page 2](#)
- **Agent:** Other devices in the network are enabled as agents, and communicate with the SD-AVC network service. See: [Configuring Network Devices to Use SD-AVC](#)
- **High Availability:** SD-AVC supports a high availability (HA) configuration, using more than one SD-AVC network service. See: [SD-AVC High Availability](#)
- **Connectivity:** Operating SD-AVC requires connectivity between the SD-AVC network service and the SD-AVC agents that operate on devices in the network. See: [Configuring Connectivity, on page 3](#)

## Summary of Setup

The following table briefly describes the steps to set up SD-AVC:

**Table 1: Setup**

	Setup Task	Section
1	Download the open virtual appliance (OVA) file for the SD-AVC network service and install it on a host device accessible by other devices in the network.	See: <a href="#">Installing the SD-AVC Network Service, on page 4</a>
2	Enable the SD-AVC agent on Cisco devices in the network, pointing them to the SD-AVC network service set up in the previous step. (In a high availability setup, include more than one SD-AVC network service instance.)	See: <a href="#">Configuring Network Devices</a>
3	Configure connectivity, or optionally, secure connectivity.	See: <a href="#">Configuring Connectivity, on page 3</a> , <a href="#">Configuring Secure Connectivity</a>

- [System Requirements: SD-AVC Network Service Host, on page 2](#)
- [Configuring Connectivity, on page 3](#)

- [Using SD-AVC with Cisco IWAN, on page 4](#)
- [Installing the SD-AVC Network Service, on page 4](#)
- [Upgrading the SD-AVC Network Service, on page 9](#)

## System Requirements: SD-AVC Network Service Host

The following table describes platform requirements for hosting the SD-AVC network service.

**Table 2: SD-AVC Network Service Host Requirements**

Host	Memory	Storage	Recommended OS (extended maintenance release trains only)	CPU
Cisco ASR1001-X Aggregation Services Routers	M-ASR1001X-16GB	NIM-SSD and SSD-SATA-400G	Cisco IOS XE Everest 16.6.1 or later	—
Cisco ASR1002-X Aggregation Services Router	M-ASR1002X-16GB	MASR1002X-HD-320G	Cisco IOS XE Everest 16.6.1 or later	—
Cisco ASR1002-HX Aggregation Services Router	M-ASR1002HX-16GB	NIM-SSD and SSD-SATA-400G	Cisco IOS XE Fuji 16.7.1 or later	—
Cisco ISR4431 Integrated Services Router	RAM: MEM-4400-4GU16G  Flash: MEM-FLASH-16G	NIM-SSD and SSD-MSATA-400G	Cisco IOS XE Everest 16.6.1 or later	—
Cisco ISR4451 Integrated Services Router	RAM: MEM-4400-4GU16G  Flash: MEM-FLASH-16G	NIM-SSD and SSD-MSATA-400G	Cisco IOS XE Everest 16.6.1 or later	—

Host	Memory	Storage	Recommended OS (extended maintenance release trains only)	CPU
Cisco CSR1000V Cloud Services Router	Minimum: 8 GB Recommended: 8 GB	20 GB	Cisco IOS XE Everest 16.6.1 or later	Large-scale scenario (100 or more devices): 4 cores  Small-scale scenario (<100 devices): 1 core  See: <a href="#">Allocating VM CPUs for Cisco CSR1000V</a>

## Configuring Connectivity

Operating SD-AVC requires connectivity between various components.

- SD-AVC network service and host
- SD-AVC network service and agents
- Connectivity to the SD-AVC Dashboard

This section describes the connectivity requirements. If secure connectivity is required, see: [Configuring Secure Connectivity](#)

### Connectivity between SD-AVC Network Service and Host

Connectivity is required between the SD-AVC network service, which operates as a virtualized service, and the device hosting it. The host platform requires connectivity with the service through a virtual interface called VirtualPortGroup. The virtual service communicates with the host over this virtual interface, using SSH on TCP port 22.

### Connectivity between SD-AVC Network Service and Agents

Network devices operating with SD-AVC use an SD-AVC agent, which operates in the background on the device, to communicate with the central SD-AVC network service. Connectivity is required between each of these network devices and the SD-AVC network service (more than one network service in SD-AVC high availability configurations).

#### • Ports

Communication between agent and service uses the following protocols and ports:

- **UDP:** Port 50000
- **TCP:** Ports 21, 8080, 59990-60000

- **Firewalls and Access Lists**

Ensure that communication is possible from the SD-AVC agent to the SD-AVC network service on these ports for the relevant traffic. For example:

- Firewall policy must enable communication from the SD-AVC agent to the SD-AVC network service.
- If a network device has an access control list (ACL) configured, the ACL must permit communication from the SD-AVC agent to the SD-AVC network service.

### Connectivity to the SD-AVC Dashboard

Connecting to the SD-AVC Dashboard (see [Using SD-AVC](#)) requires access to the device hosting the SD-AVC network service, and involves TCP traffic through port 8443. Ensure that network policy (firewall, ACL, and so on) permits this connectivity for devices requiring access to the SD-AVC Dashboard.

## Using SD-AVC with Cisco IWAN

When operating SD-AVC in a Cisco IWAN environment, the SD-AVC network service may be hosted on the hub master controller (MC) or on a router dedicated for the purpose of hosting the service.

In either case, verify that the host device meets the system requirements for hosting the SD-AVC network service.

See: [System Requirements: SD-AVC Network Service Host, on page 2](#), [Installing the SD-AVC Network Service, on page 4](#)

## Installing the SD-AVC Network Service

The SD-AVC network service operates as a virtualized service on a Cisco router. It is installed as an open virtual appliance (OVA) virtual machine container, and requires a few steps of configuration on the host router. After configuration is complete, you can check service status using the browser-based SD-AVC Dashboard.

**Table 3: Overview of Installation Steps**

Task	Steps
System requirements	Step 1
Installation	Steps 2 to 7
Configuration, Activation	Step 8 to 12
Verification	Steps 13 to 14
Connecting to SD-AVC Dashboard	Step 15

Examples follow the steps below.

## Installation Procedure

The following procedure installs the SD-AVC network service as a virtualized service on a Cisco router.

1. Verify that the intended host device meets the system requirements. See: [System Requirements: SD-AVC Network Service Host, on page 2](#)
2. Download the OVA container for the SD-AVC network service from Cisco.com, using the [Download Software](#) tool. Specify a platform that supports hosting the SD-AVC virtual service, then navigate to software downloads for the platform. Select the "SD AVC Router Virtual Service" option to display available OVA files for SD-AVC.

Example filename: **iosxe-sd-avc.2.1.0.ova**

3. Copy the downloaded OVA file onto the device that will host the SD-AVC network service. Copy to one of the following locations, depending on the platform type:
  - For the CSR1000V router, use: **bootflash**
  - For ASR1000 Series or ISR4000 Series devices, use: **harddisk**

**harddisk** refers to the SSD or HD specified in the system requirements for the platform ([System Requirements: SD-AVC Network Service Host, on page 2](#)).
4. On the device, verify that the MD5 checksum of the downloaded package matches the checksum value provided.



**Note** The correct MD5 checksum value appears on the [Download Software](#) page when downloading the package.

```
verify /md5 bootflash:ova-filename.ova
```

### Example:

```
Device#verify /md5 bootflash:iosxe-sd-avc.2.1.0.ova
.....Done!
verify /md5 (bootflash:iosxe-sd-avc.2.1.0.ova) = d8b7af1b163ccc5ad28582a3fd86c44e
```

5. Ensure that the system time is set correctly on the host device.
  - (If using an NTP server) Verify that the platform is connected to the NTP server and that the system time is correct.
  - (If setting time manually) Set the system time correctly.



**Important** If you change the system time after the SD-AVC service is already running, uninstall and re-install the SD-AVC service to ensure correct synchronization.

[Unconfiguring or Uninstalling the SD-AVC Network Service Installation Overview, on page 1](#)

6. If specific DNS servers are required, configure the server(s) on the host device.



**Important** Adding DNS servers after SD-AVC is active restarts the SD-AVC network service. During restart, the following are interrupted:

- Protocol Pack deployment to network devices
- Vertical debug

7. On the host device, execute the following command to extract the OVA package and install the SD-AVC network service. By default, it is installed on the same storage device where the OVA package was saved.

**service sd-avc install package** *disk-with-OVA:OVA-filename* **media** *location-for-OVA-expansion*

**Table 4: Command Details**

CLI keyword/argument	Description
<i>disk-with-OVA</i>	Specify one of the following, according to the platform type. The location refers to where the OVA was saved in a previous step. <ul style="list-style-type: none"> <li>• CSR: <b>bootflash</b></li> <li>• ASR1000 Series or ISR4000 Series: <b>harddisk</b></li> </ul>
<i>OVA-filename</i>	Downloaded OVA file.
<i>location-for-OVA-expansion</i>	Specify one of the following, according to the platform type: <ul style="list-style-type: none"> <li>• For CSR1000V routers, use: <b>bootflash</b></li> <li>• For ASR1000 Series or ISR4000 Series devices, use only: <b>harddisk</b></li> </ul> <p><b>Important</b> On ASR1000 and ISR4000 platforms, do not use <b>bootflash</b>. The CLI may allow you incorrectly to choose <b>bootflash</b>, but but this causes the step to fail. On these platforms, specify <b>only harddisk</b>.</p>

**Examples:**

- For CSR1000V router:

```
service sd-avc install package bootflash:iosxe-sd-avc.2.1.0.ova media bootflash
```

- For ASR1000 Series or ISR4000 Series routers:

```
service sd-avc install package harddisk:iosxe-sd-avc.2.1.0.ova media harddisk
```

8. Configure the SD-AVC network service.
  - Specify the router gateway interface that the virtualized service uses for external access.
  - Specify a user-selected external-facing service IP address for the SD-AVC network service. This address must be within the same subnet as the gateway interface address.

This step accomplishes the following:

- Enables routers in the network to communicate with the SD-AVC network service.
- Enables access to the browser-based SD-AVC Dashboard.



**Note** Use this command only in scenarios in which the gateway interface is not attached to a VRF. If the gateway interface is attached to a VRF, use the steps described in [Operating the SD-AVC Network Service with Host Interface Attached to a VRF](#).

**service sd-avc configure gateway interface *interface* service-ip *service-ip-address* [activate | preview]**

**Table 5: Command Details**

CLI keyword/argument	Description
<b>activate</b>	Activates the service immediately. It is not typically recommended to use this option during this configuration step. Execute the <code>activate</code> option in a separate step, as shown below.
<b>preview</b>	<p>Preview the configuration without configuring or activating the service. When using this option, the configuration is not sent to the device.</p> <p><b>Note:</b> If the gateway interface is attached to a VRF, see <a href="#">Operating the SD-AVC Network Service with Host Interface Attached to a VRF</a>.</p> <p><b>Example output:</b></p> <pre>! Virtual port configuration interface VirtualPortGroup31   description automatically created for sd-avc service by   'service sd-avc configure' exec command   ip unnumbered gigabitEthernet1 end  ! Virtual service configuration virtual-service SDAVC   description automatically created for sd-avc service by   'service sd-avc configure' exec command   vnic gateway VirtualPortGroup31     guest ip address 10.56.196.101   exit end  ! Static route configuration ip route 10.56.196.101 255.255.255.255 VirtualPortGroup31</pre>
<b><i>interface</i></b>	<p>Gateway interface: The device interface that the virtualized service uses for external access.</p> <p><b>Note:</b> If the interface is attached to a VRF, see <a href="#">Operating the SD-AVC Network Service with Host Interface Attached to a VRF</a> for instructions for configuring the gateway.</p>

CLI keyword/argument	Description
<i>service-ip-address</i>	External-facing IP address, must be in the same subnet as the IP of the gateway interface.  <b>Example:</b> Gateway interface: 10.56.196.100 service-ip-address: 10.56.196.101

**Example:**

```
service sd-avc configure gateway interface gigabitEthernet1 service-ip 10.56.196.146
```

9. Activate the service.

**service sd-avc activate****Example:**

```
service sd-avc activate
```

10. Verify that the status of the SD-AVC network service is activated.

**service sd-avc status**

If installation and activation were successful, the displayed status is:

```
SDAVC service is installed, configured and activated
```

11. (ASR1000 Series or ISR4000 Series routers only, not CSR1000 Series) Execute the following:

```
(config)#platform punt-policer service-engine 100000 100000
```

12. Save the new configuration.

**copy running-config startup-config**

13. Ping the service IP configured in a previous step to verify that it is reachable.

14. Verify that SSH is enabled on the host device. Details vary according to different scenarios, but the following is a helpful reference:

<https://www.cisco.com/c/en/us/support/docs/security-vpn/secure-shell-ssh/4145-ssh.html>

**Example (uses SSH local authentication):**

```
aaa new-model
!
aaa authentication login default local
username cisco privilege 15 password cisco
ip domain name cisco.com
crypto key generate rsa
```

15. Wait several minutes for the service to become fully active, then use a Chrome browser to access the browser-based SD-AVC Dashboard, at the following URL, which uses the service-ip configured in an earlier step and port 8443. The SD-AVC Dashboard uses the same authentication as the platform hosting the SD-AVC network service.

<https://<service-ip>:8443>





**Note** Accessing the SD-AVC Dashboard requires connectivity from the PC you are using to access the SD-AVC interface.

### Installation Example for CSR1000V Router

The following is an example of the CLI steps used to install the SD-AVC Network Service on a Cisco CSR1000V Cloud Services Router. For this router, the first step includes “bootflash” as the location for extracting the OVA.

```
service sd-avc install package harddisk:iosxe-sd-avc.2.1.0.ova media bootflash
service sd-avc configure gateway interface gigabitEthernet1 service-ip 10.56.196.146
service sd-avc activate
service sd-avc status
copy running-config startup-config
```

### Installation Example for ASR1000 Series or ISR4000 Series Routers

The following is an example of the CLI steps used to install the SD-AVC network service on a Cisco ASR1000 Series or ISR4000 Series Router. For these routers, the first step includes “harddisk” as the location for extracting the OVA.

```
service sd-avc install package harddisk:iosxe-sd-avc.2.1.0.ova media harddisk
service sd-avc configure gateway interface gigabitEthernet1 service-ip 10.56.196.146
service sd-avc activate
service sd-avc status
platform punt-policer service-engine 100000 100000
copy running-config startup-config
```

## Upgrading the SD-AVC Network Service

Use the following procedure to upgrade the SD-AVC network service on the router hosting the service.



**Note** Upgrading clears the traffic data stored by the SD-AVC network service.

**Table 6: Overview of Upgrade Steps**

Task	Steps
Installation	Steps 1 to 7
Activation	Step 8
Verification	Step 9

1. Download the OVA container for the SD-AVC network service from Cisco.com, using the [Software Download](#) tool. Specify a platform that supports hosting the SD-AVC virtual service, then navigate to software downloads for the platform. Select the "SD AVC Router Virtual Service" option to display available OVA files for SD-AVC.

Example filename: **iosxe-sd-avc.2.1.0.ova**

- Copy the downloaded OVA file onto the device hosting the SD-AVC network service to be upgraded. Copy to one of the following locations, depending on the platform type:

- CSR1000V: **bootflash**
- ASR1000 Series or ISR4000 Series: **harddisk**

**harddisk** refers to the SSD or HD specified in the system requirements for the platform ([System Requirements: SD-AVC Network Service Host, on page 2](#)).

- On the device, verify the MD5 checksum of the downloaded package. The correct MD5 checksum value appears on the [Download Software](#) page when downloading the package.

**verify /md5 bootflash:ova-filename.ova**

**Example:**

```
Device#verify /md5 bootflash:iosxe-sd-avc.2.1.0.ova
.....Done!
verify /md5 (bootflash:iosxe-sd-avc.2.1.0.ova) = d8b7af1b163ccc5ad28582a3fd86c44e
```

- Deactivate the service. This step stops the service but does not erase the database of compiled application data.

**service sd-avc deactivate**

- Verify that the service has been deactivated.

**service sd-avc status**

The following output confirms that the service has been deactivated:

```
Service SDAVC is installed, configured and deactivated
```

- On the host router, execute the following command to extract and install the OVA package. By default, it is installed on the same storage device where the OVA package is stored.

**service sd-avc upgrade package disk-with-OVA:OVA-filename**

**Table 7: Command Details**

CLI keyword/argument	Description
<i>disk-with-OVA</i>	Specify one of the following, according to the platform type. The location refers to where the OVA was stored in a previous step. <ul style="list-style-type: none"> <li>• CSR: <b>bootflash</b></li> <li>• ASR1000 Series or ISR4000 Series: <b>harddisk</b></li> </ul>
<i>OVA-filename</i>	Downloaded OVA file.

**Examples:**

- For Cisco CSR1000V router:

```
service sd-avc upgrade package bootflash:iosxe-sd-avc.2.1.0.ova
```

- For Cisco ASR1000 Series or ISR4000 Series routers:

```
service sd-avc upgrade package harddisk:iosxe-sd-avc.2.1.0.ova
```

7. (Optional) During the upgrade process, view the service status.

**service sd-avc status**

During the upgrade, the following output indicates that the service is being installed:

```
Service SDAVC is installing..., configured and deactivated
```

The following output indicates that the upgrade is complete:

```
Service SDAVC is installed, configured and deactivated
```

8. Activate the service.

**service sd-avc activate**

**Example:**

```
service sd-avc activate
```

9. Verify that the status of the SD-AVC network service is activated.

**service sd-avc status**

If upgrade and activation were successful, the displayed status is:

```
SDAVC service is installed, configured and activated
```

