Installing or Upgrading the SD-AVC Network Service

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: Installing the SD-AVC Network Service, on page 4
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: Configuring Network Devices
3	Configure connectivity, or optionally, secure connectivity.	See: Configuring Connectivity, on page 3, Configuring Secure Connectivity

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	OS	CPU
Cisco ASR1001-X	M-ASR1001X-16GB	NIM-SSD and SSD-SATA-400G	Cisco IOS XE Everest 16.6.1 or later	—
Cisco ASR1002-X	M-ASR1002X-16GB	MASR1002X-HD-320G	Cisco IOS XE Everest 16.6.1 or later	—
Cisco ISR4431	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	RAM: MEM-4400-4GU16G Flash: MEM-FLASH-16G	NIM-SSD and SSD-MSATA-400G	Cisco IOS XE Everest 16.6.1 or later	—
Cisco Cloud Services Router CSR1000V	Minimum: 8 GB Recommended: 8 GB	20 GB	Cisco IOS XE Everest 16.6.1 or later	4 cores

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

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.

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 20, 21, 50000-60000

- **Firewalls and Access Lists**

  Ensure that communication is possible in both directions (agent to SD-AVC Network Service, SD-AVC Network Service to agent) on these ports for the relevant traffic. For example:

  - Firewall policy must enable communication in both directions.
  - If a network device has an access control list (ACL) configured, the ACL must permit communication between the SD-AVC Network Service and SD-AVC agents.

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). For information about installing the SD-AVC Network Service, see 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 4
Configuration	Step 5
Activation	Step 6
Verification	Steps 7 to 10
Connecting to SD-AVC Dashboard	Step 11

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.1.1.0.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:

- 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).

4 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
disk-with-OVA	Specify one of the following, according to the platform type. The location refers to where the OVA was saved in a previous step. • CSR: bootflash • ASR1000 Series or ISR4000 Series: harddisk
OVA-filename	Downloaded OVA file.
location-for-OVA-expansion	Specify one of the following, according to the platform type: • CSR: bootflash • ASR1000 Series or ISR4000 Series: harddisk **Note** On ASR1000 and ISR4000 platforms, the CLI may allow you to incorrectly specify the bootflash for the *disk-with-OVA*, but for these platforms, specifying the bootflash as the location will cause this step to fail. On these platforms, specify only the hard disk for *disk-with-OVA* location.

Examples:

- For CSR1000V router:

```
service sd-avc install package bootflash:iosxe-sd-avc.1.1.0.ova media bootflash
```

- For ASR1000 Series or ISR4000 Series routers:

```
service sd-avc install package harddisk:iosxe-sd-avc.1.1.0.ova media harddisk
```

5 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
activate	Activates the service immediately. It is not typically recommended to use this option during this configuration step. Execute the `activate` option in a separate step, as shown below.

preview	Preview the configuration without configuring or activating the service. When using this option, the configuration is not sent to the device.
	Note: If the gateway interface is attached to a VRF, see Operating the SD-AVC Network Service with Host Interface Attached to a VRF.
	Example output:
	`! 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`

interface	Gateway interface: The device interface that the virtualized service uses for external access. **Note**: If the interface is attached to a VRF, see Operating the SD-AVC Network Service with Host Interface Attached to a VRF for instructions for configuring the gateway.

CLI keyword/argument	Description
service-ip-address	External-facing IP address, must be in the same subnet as the IP of the gateway interface. **Example**: 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
```

6 Activate the service.

service sd-avc activate

Example:

```
service sd-avc activate
```

7 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
```

8 Save the new configuration.

copy running-config startup-config

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

10 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
```

11 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.1.1.0.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.1.1.0.ova media harddisk
service sd-avc configure gateway interface gigabitEthernet1 service-ip 10.56.196.146
service sd-avc activate
service sd-avc status
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.

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

   service sd-avc deactivate

2. 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
   ```

3. 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* **media** *location-for-OVA-expansion*

   Table 6: Command Details

CLI keyword/argument	Description
disk-with-OVA	Specify one of the following, according to the platform type. The location refers to where the OVA was stored in a previous step. • CSR: bootflash • ASR1000 Series or ISR4000 Series: harddisk
OVA-filename	Downloaded OVA file.

CLI keyword/argument	Description
location-for-OVA-expansion	Specify one of the following, according to the platform type: • CSR: bootflash • ASR1000 Series or ISR4000 Series: harddisk **Note** On ASR1000 and ISR4000 platforms, the CLI may allow you to specify the bootflash for the *disk-with-OVA*, but on these platforms, specifying the bootflash as the location will cause this step to fail. On these platforms, specify only the hard disk for *disk-with-OVA* location.

Examples:

- For Cisco CSR1000V router:

```
service sd-avc upgrade package bootflash:iosxe-sd-avc.1.1.0.ova media bootflash
```

- For Cisco ASR1000 Series or ISR4000 Series routers:

```
service sd-avc upgrade package harddisk:iosxe-sd-avc.1.1.0.ova media harddisk
```

4 (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
```

5 Activate the service.

service sd-avc activate

Example:

```
service sd-avc activate
```

6 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
```