AppNav-XE for Cisco Catalyst SD-WAN

Table 1: Feature History

Feature Name	Release Information	Description
AppNav-XE	Cisco IOS XE Catalyst SD-WAN Release 17.2.1r	This feature lets you configure policy-based redirection of LAN-to-WAN and WAN-to-LAN traffic flows to WAAS nodes for WAN optimization on Cisco IOS XE Catalyst SD-WAN devices . This feature was already available on Cisco IOS XE platforms and is being extended to Cisco IOS XE Catalyst SD-WAN platforms in this release.

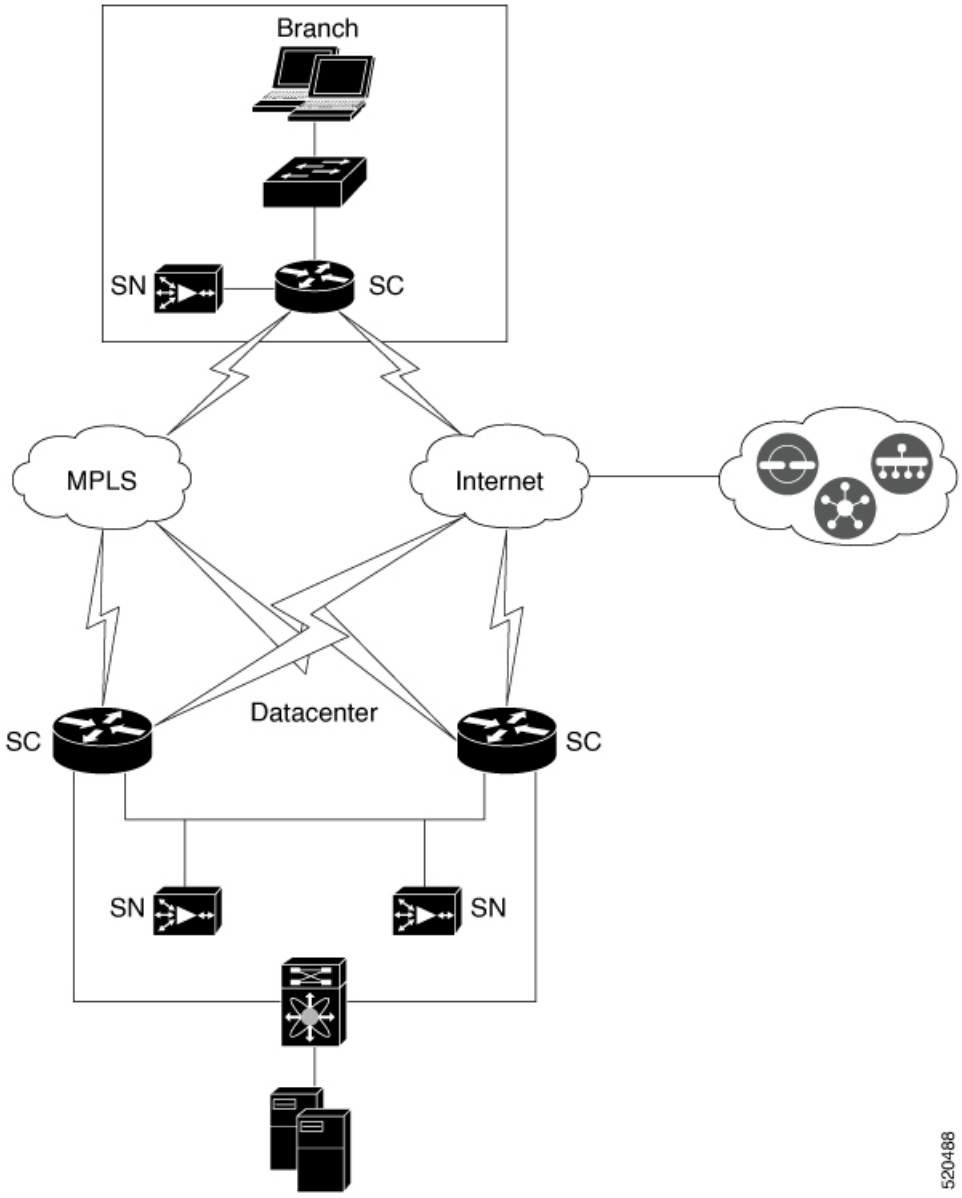
Overview of AppNav-XE

The AppNav-XE feature facilitates intelligent distribution of traffic flows to WAAS devices. WAAS devices are used for WAN optimization.

AppNav-XE reduces dependency on the intercepting router by distributing traffic among WAAS devices for optimization using a class and policy mechanism. You can use WAAS nodes (WNs) to optimize traffic based on sites and/or applications. The AppNav-XE solution can scale up to available capacity by taking into account WAAS device utilization as it distributes traffic among nodes. The solution provides high availability of optimization capacity by monitoring node overload; and by providing configurable failure and overload policies.

Topology Example

Figure 1: Example Topology



*SN: Service nodes or WAAS nodes (up to 64)
*SC: A Cisco IOS XE Catalyst SD-WAN device acting as a service controller (up to 4)

The image above shows an example of Cisco Catalyst SD-WAN deployment with AppNav-XE. The Cisco IOS XE Catalyst SD-WAN devices at the data center and branches are enabled with the AppNav-XE feature and form an AppNav cluster with WAAS nodes.

Benefits of AppNav-XE

- Enables enterprises to expand services efficiently and cost-effectively.
- Supports the use of flexible policy definitions.
- Integrated with Cisco Catalyst SD-WAN network services, which eliminates the need for any additional hardware.
- Intelligently redirects new flows based on the load on each service node. This also includes the load on individual L7 application accelerators.
- For flows that don't require any optimization, service nodes can inform the AppNav Controller to directly pass-through the packets, thus minimizing the latency and resource utilization.
- Has minimal impact to traffic when adding or removing service nodes.
- Supports VRFs, so that the VRF information is preserved when traffic returns from a service node.
- Supports optimization of asymmetric flows through AppNav controller groups.

Note An asymmetric flow is when the traffic in one direction goes through one AppNav Controller and the return traffic goes through a different AppNav Controller; but both AppNav Controllers redirect the traffic to the same service node.

- Provides inter-router high availability to keep traffic flows uninterrupted, where if one router goes down, the traffic can be re-routed to a different router within the AppNav Controller group.

Components of AppNav-XE

- AppNav Cluster: A group of all AppNav controllers and WAAS nodes at a site. Typically, each enterprise site, such as branch and data center, has an AppNav cluster.
- AppNav Controller: A device that intercepts network traffic and, based on an AppNav policy, distributes that traffic to one or more WAAS nodes (WNs) for optimization. The device in this context is a Cisco IOS XE Catalyst SD-WAN device running AppNav-XE.
- WAAS Nodes: Wide Area Application Services (WAAS) nodes or service nodes are WAAS optimization engines or vWAAS instances that optimize and accelerate traffic based on the optimization policies configured on the device.

Note WAAS service nodes are outside the scope of this document.

- WAAS Central Manager (WCM): WCM devices host WCM, a Web-based interface that allows you to configure, manage, and monitor AppNav controllers and WAAS nodes in your network. In AppNav-XE for Cisco Catalyst SD-WAN, WCM communicates with Cisco SD-WAN Manager, which is the network management system used to configure Cisco IOS XE Catalyst SD-WAN devices. Cisco SD-WAN Manager then pushes the AppNav-XE configuration to the Cisco IOS XE Catalyst SD-WAN devices. However, WAAS nodes in an AppNav cluster still receive their configuration through WCM. Monitoring

of WAAS nodes and AppNav-XE on Cisco IOS XE Catalyst SD-WAN devices is done directly through WCM.

- Cisco SD-WAN Manager: This is the primary management system in Cisco Catalyst SD-WAN. Therefore, WCM sends the AppNav-XE configuration to Cisco SD-WAN Manager, which in turn pushes it to the AppNav-XE controllers.

Supported Platforms

The following platforms support AppNav-XE for Cisco Catalyst SD-WAN.

- Cisco 1000 Series Aggregation Services Routers
- Cisco 4000 Series Integrated Services Routers
- Cisco Cloud Services Router 1000V Series
- C8500-12X4QC and C8500-12X Series Aggregation Services Routers
- C8300 Series Integrated Services Routers

Managing AppNav-XE in Cisco Catalyst SD-WAN

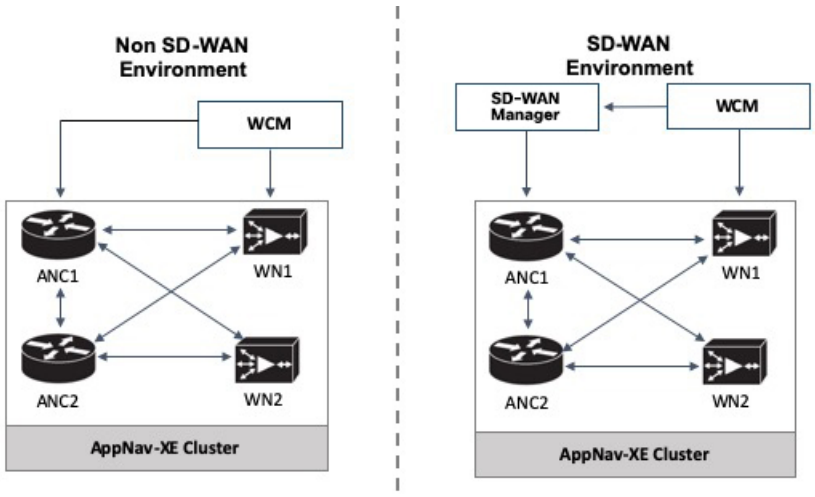
The AppNav-XE feature was already supported on IOS XE platforms. However, starting from Cisco IOS XE Release 17.2, the feature is extended to Cisco IOS XE Catalyst SD-WAN platforms. Note that for this feature to work, Cisco SD-WAN Manager should be running release 20.1.1 or later.

AppNav-XE in SD-WAN versus non-SD-WAN Environments

How AppNav-XE is configured in SD-WAN is different from how it's configured in non-SD-WAN environments. The major difference is the involvement of Cisco SD-WAN Manager, which acts as an intermediary between WCM and AppNav-XE controllers, to push the AppNav policy configuration to Cisco IOS XE Catalyst SD-WAN devices. Cisco IOS XE Catalyst SD-WAN devices act as AppNav-XE controllers.

The following image shows the differences in the deployment of AppNav-XE in SD-WAN and non-SD-WAN environments.

Figure 2: Comparison: AppNav-XE in SD-WAN versus non Catalyst SD-WAN Environments



AppNav-XE in IOS XE: The WCM GUI directly communicates with the AppNav Controller (ANC) and the WAAS Nodes (WN) in the AppNav cluster to push the configuration.

AppNav-XE in IOS XE SD-WAN: The major difference is in terms of how the AppNav policy configuration is pushed to the AppNav Controllers (ANC). Here, the feature is configured through both WCM GUI and Cisco SD-WAN Manager. You continue to configure the AppNav-XE feature in WCM. WCM then sends the configuration to Cisco SD-WAN Manager, which in turn pushes the configuration to AppNav controllers. The communication between WCM and Cisco SD-WAN Manager is achieved through registering WCM as a third-party controller with Cisco SD-WAN Manager. WCM still directly sends the configuration to the WAAS nodes.

Configure AppNax-XE on Cisco IOS XE Catalyst SD-WAN Devices

Perform the following procedures to configure AppNav-XE on Cisco IOS XE Catalyst SD-WAN devices.

1. Register WCM as a third-party controller with Cisco SD-WAN Manager.
2. Attach the Cisco IOS XE Catalyst SD-WAN device to the WCM partner.
3. Register the Cisco IOS XE Catalyst SD-WAN device with the WCM partner attached to Cisco SD-WAN Manager.
4. Configure AppNav-XE Cluster for SD-WAN, on page 8

Register WCM in Cisco SD-WAN Manager

This topic describes how to access Cisco WAAS Central Manager (WCM) and register WCM as s third-party controller on Cisco SD-WAN Manager. It also describes how to attach an Cisco IOS XE Catalyst SD-WAN device to the WCM partner through Cisco SD-WAN Manager.

Access the WCM GUI

To access the WAAS Central Manager GUI, enter the following URL in your web browser:

https:// *WAE_Address* :8443/

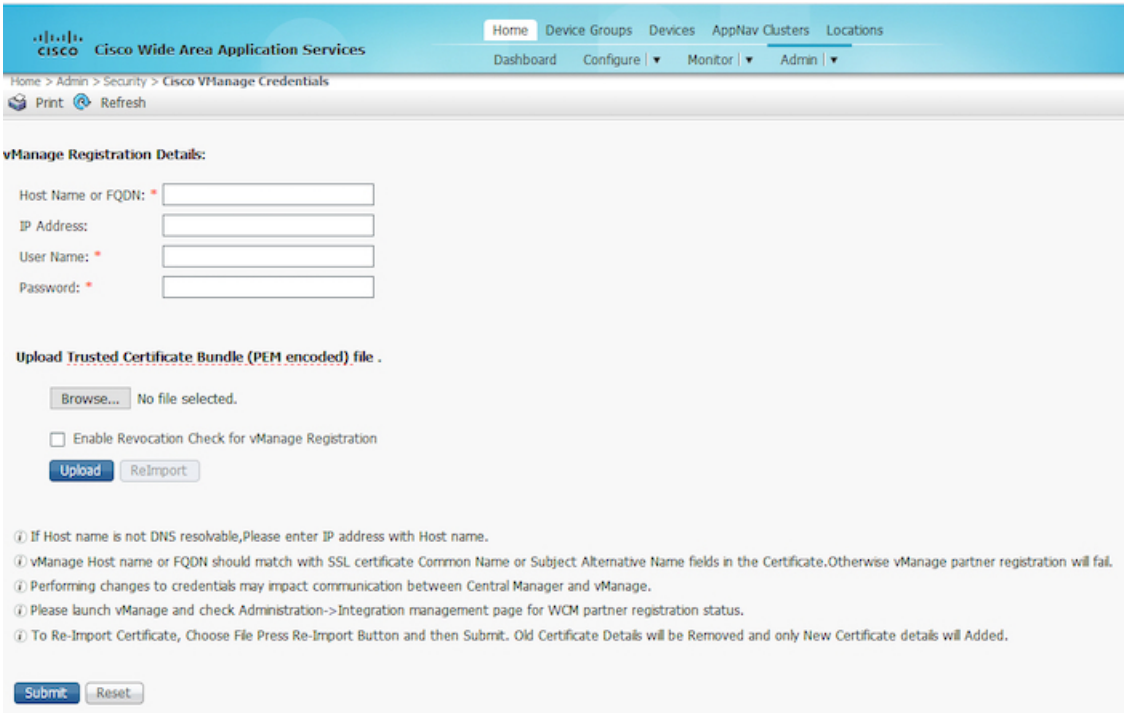
The *WAE_Address* value is the IP address or host name of the WAAS Central Manager device.

The default administrator username is *admin* and the password is *default*.

Integrate WCM with Cisco SD-WAN Manager

1. From the WCM GUI homepage,choose **Admin**.
2. Next, choose **Security** > **Cisco vManage Credentials**.
3. Provide the requested information.

Figure 3: WCM GUI



To register using a Fully Qualified Domain Name (FQDN), enter the FQDN in the Host Name field. The IP Address field should remain empty.

4. Upload the trusted issuer certificate bundle in PEM format for the Cisco SD-WAN Manager web server certificate.

Note Use the re-import button to re-upload the trusted issuer certificate bundle, which replaces the existing certificate bundle.

5. To enable revocation check of the Cisco SD-WAN Manager web server certificate, choose the **Revocation Check** option.

   Note that only OSCP based revocation check is supported.

6. Click **Submit**.

Once integrated, the WCM partner can be seen from the Cisco SD-WAN Manager menu by choosing **Administration** > **Integration Management**.

Attach Cisco IOS XE Catalyst SD-WAN Device to WCM Partner

1. From the Cisco SD-WAN Manager menu, choose **Administration** > **Integration Management**.

   You'll see the list of third-party controllers registered on Cisco SD-WAN Manager.

2. For the desired WCM partner, click **...** and choose **Attach Devices**.
3. In the **Available Devices** column on the left, choose a device from the list.
4. Click **Attach**.
5. To configure AppNav-XE on the device, register the device in WCM next.

Register Cisco XE SD-WAN Device with WCM

Prerequisites

- The device being registered should be in Manager mode in the Cisco SD-WAN Manager GUI. For more information, see Change Configuration Modes in Cisco SD-WAN Manager
- The device being registered must have HTTPS configuration attached to it. The HTTPS configuration can be attached to the device using the Global Settings template in Cisco SD-WAN Manager.

  1. From Cisco SD-WAN Manager menu, choose **Configuration** > **Templates**.
  2. Click **Feature Templates** then click **Add Template**.

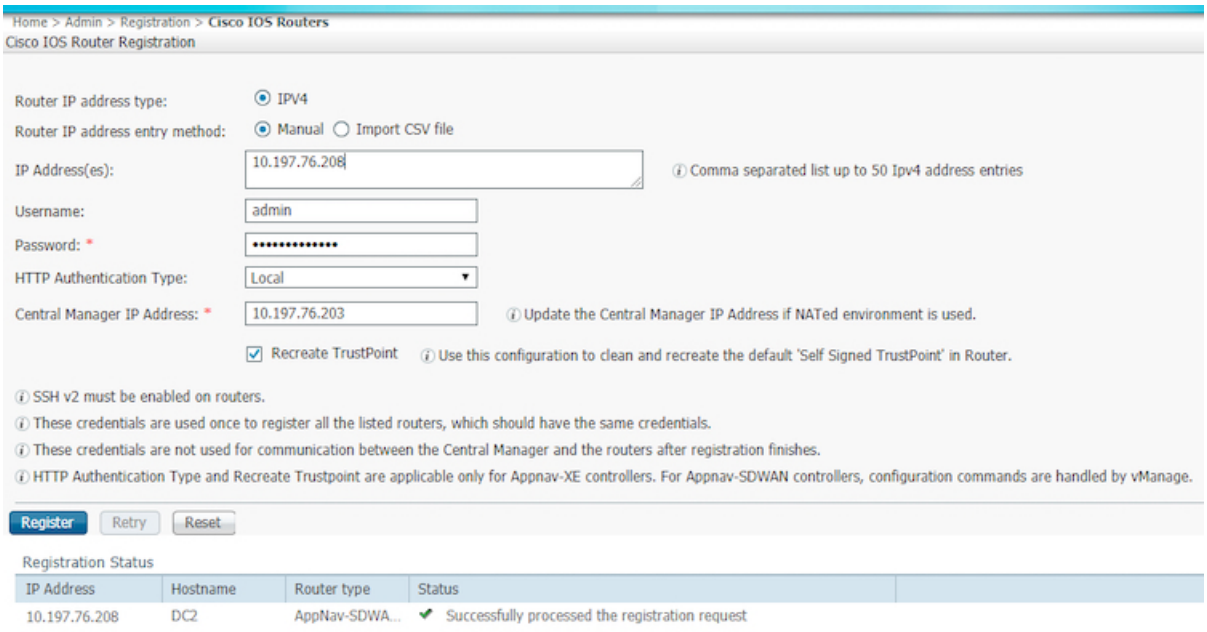
Note In Cisco vManage Release 20.7.x and earlier releases **Feature Templates** is called **Feature**.

  3. Under the **Basic Information** area in the right pane, choose the **Global Settings** template.
  4. Click **Services**.
  5. For both the fields—HTTP Server and HTTPS Server, from the drop-down list, choose **Global** and choose **On**.

Register the Device on WCM

1. In WCM, navigate to the **Admin** section.

2. Choose **Registration** > **Cisco IOS Routers**.
3. Enter the requested details and click **Register**.



The registration status of the device is displayed in the lower part of the screen.

4. Click **Submit**.

Configure AppNav-XE Cluster for SD-WAN

The configuration of AppNav-XE clusters for Cisco Catalyst SD-WAN environments through WCM remains the same as the configuration for non-Cisco Catalyst SD-WAN environments, except for a few different steps. Refer to the following links from the AppNav-XE configuration guide. Any difference in configuration for Cisco Catalyst SD-WAN has been called out with notes.

- Create a Cisco AppNav-XE Cluster with the AppNav Cluster Wizard
- Configure a Class Map on an AppNav-XE Cluster
- Configure AppNav-XE Policy Rules on an AppNav-XE Cluster
- Configure AppNav Controller Settings for an AppNav-XE Device
- Manage AppNav-XE Policies
- Enable Cisco WAAS Service Insertion on AppNav-XE Device Interfaces

Monitor and Troubleshoot AppNav-XE

The AppNav-XE component on your Cisco IOS XE Catalyst SD-WAN devices can be monitored through CLI on your devices and through the WCM GUI.

Monitor AppNav-XE

- **Through CLI:** See Monitoring the AppNav-XE Component
- **Through WCM GUI:** See Monitoring an AppNav Cluster

Troubleshoot AppNav-XE

For information on common problems and how to troubleshoot them using various debug commands, see Troubleshooting AppNav-XE.