



Cisco Crosswork Network Controller 4.1 Getting Started Guide

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This document provides a high-level description of the steps that are required to install the Cisco Crosswork Network Controller solution, which is made up of the Cisco Crosswork Infrastructure, Cisco Crosswork Data Gateway, and several Cisco Crosswork applications.

It is a companion handbook to the [Cisco Crosswork Infrastructure 4.3 and Applications Installation Guide](#), which provides full installation requirements and details for the Cisco Crosswork portfolio.

Each step in this high-level installation workflow links directly to the sections in the above-mentioned installation guide, making it easier for you to find information specific to Crosswork Network Controller.

This document is not intended to be a comprehensive installation guide.

Cisco Crosswork Network Controller

Cisco Crosswork Network Controller is a network automation solution for deploying and operating IP transport networks that delivers increased service agility, cost efficiency, and optimization for faster time-to-customer value and lower operating costs.

The solution combines intent-based network automation to deliver critical capabilities for service orchestration and fulfillment, network optimization, service path computation, device deployment and management, and anomaly detection and automatic remediation. Using telemetry gathering and automated responses, Cisco Crosswork Network Controller delivers network optimization capabilities that are nearly impossible to replicate even with a highly skilled and dedicated staff operating the network.

Its unified user interface allows real-time visualization of the network topology and services, monitoring of services and their health status, as well as service and transport provisioning, through a single pane of glass.

The fully integrated solution combines core capabilities from multiple innovative, industry-leading products including Cisco® Network Services Orchestrator (NSO), Cisco Segment Routing Path Computation Element (SR-PCE), and the Cisco Crosswork suite of applications.

In 4.1 release, the Crosswork Network Controller solution is bundled as **Essentials** and **Advantage** packages.

Table 1: Cisco Crosswork Network Controller Packages

Essentials package	Advantage package
Cisco Crosswork Optimization Engine Cisco Crosswork Active Topology	Cisco Crosswork Optimization Engine Cisco Crosswork Active Topology Cisco Crosswork Service Health Cisco Crosswork Health Insights Cisco Crosswork Change Automation Cisco Crosswork Zero Touch Provisioning Cisco Element Management System (EMS) Services Note Cisco Service Health is accessible through Limited Availability. Engage your account team for further details.

Installation Requirements for Cisco Crosswork Network Controller Components

The cluster resource requirements for deploying Cisco Crosswork Network Controller are explained in the below table:



Attention A cluster with only 3 hybrid VM nodes (without any worker VM nodes) is NOT resilient. If one of the VM fails, it will certainly result in an impaired system performance, as the remaining 2 VMs will not be able to support all the pods being migrated from the failed VM.

Table 2: Cluster Requirements

Crosswork Network Controller Package	Number of Nodes ¹	Deployment Size
Essentials	3 Hybrid Nodes + 1 worker node	Large
Advantage ²	3 Hybrid Nodes + 2 worker nodes	

¹ The number of nodes mentioned is only the minimum requirement. You can add more Worker nodes (maximum upto 3 worker nodes) as needed.

² The cluster resource estimation is under the assumption that you are using all the applications in the Crosswork Network Controller Advantage package.



Attention A Crosswork cluster with only 3 Hybrid VM nodes (without any Worker VM nodes) is more prone to data loss. If one of the Hybrid VM fails, it will result in impaired system performance, as the remaining 2 Hybrid VMs struggle to support all the pods being migrated from the failed VM. Having sufficient worker nodes in your cluster ensures that the load on the Hybrid VMs remains less, therefore, ensuring more VM resiliency. For assistance in adjusting VM Memory and CPU configuration post-installation, please contact the Cisco Customer Experience team.



- Note**
- If your network requires you to use proxy servers, ensure that you have all the required information for your proxy servers before you start the install or upgrade operation.
 - If you are using self-signed certificates, ensure that you have generated all the certificates you need before you do the upgrade.

Table 3: Cisco Crosswork Network Controller Components

Components	Version	Installation Details
Cisco Crosswork Infrastructure (mandatory) A microservices-based platform that is the foundation required for running Crosswork on-premise applications.	4.4	Cisco Crosswork Installation Requirements
Cisco Crosswork Data Gateway (mandatory) Gathers information from the managed devices and forwards it to Cisco Crosswork Infrastructure and external destinations (if required).	4.1	

Components	Version	Installation Details
<p>Cisco Crosswork Optimization Engine (mandatory)</p> <p>Provides real-time network optimization that allows operators to effectively maximize network capacity utilization, as well as increase service velocity.</p>	4.1	Installation Dependencies for Cisco Crosswork Products
<p>Cisco Crosswork Active Topology (mandatory)</p> <p>Enables visualization of topology and services on logical and geographical maps.</p>	4.1	
<p>Cisco Crosswork Change Automation (optional)</p> <p>Automates the process of deploying changes to the network.</p>	4.4	
<p>Cisco Crosswork Health Insights (optional)</p> <p>Performs real-time Key Performance Indicator (KPI) monitoring, alerting, and troubleshooting.</p>	4.4	
<p>Cisco Crosswork Zero Touch Provisioning (optional)</p> <p>Brings up compatible devices quickly and easily using a Cisco-certified software image and a day-zero software configuration of the customer's choice.</p>	4.1	
<p>Cisco Crosswork Service Health (optional)</p> <p>Reduces the time required to detect and troubleshoot service quality issues. It monitors the health status of provisioned L2/L3 VPN services and enables operators to pinpoint why and where a service is degraded. It can also provide service-specific monitoring, troubleshooting, assurance, and proactive causality through a heuristic model.</p> <p>Note Cisco Service Health is accessible through Limited Availability. Engage your account team for further details.</p>	4.1	
<p>Cisco Element Management System (EMS) Services (optional)</p> <p>Provides deep inventory collection, alarm management and image management using using Inventory, Fault, and Software Image Management (SWIM) functions.</p>	4.1	

Components	Version	Installation Details
<p>Cisco Network Services Orchestrator (Cisco NSO) (mandatory)</p> <p>Crosswork Network Controller uses Cisco NSO for device management and service orchestration functionality. Cisco NSO is an orchestration platform that makes use of pluggable function packs to translate network-wide service intent into device-specific configuration. Cisco NSO provides flexible service orchestration and lifecycle management across physical and virtual network elements. For full Crosswork Network Controller functionality, Cisco NSO must be installed along with the Cisco NSO NEDs and function packs.</p>	5.7.6	Cisco NSO and NED Requirements Cisco Network Services Orchestrator 5.7.6
<p>Cisco Network Element Drivers (NEDs) (mandatory)</p> <p>Cisco NEDs comprise the network-facing part of Cisco NSO. They communicate over the native protocol supported by the device, such as Network Configuration Protocol (NETCONF), Representational State Transfer (REST), Extensible Markup Language (XML), CLI, and Simple Network Management Protocol (SNMP).</p>	<p>Cisco IOS XR:</p> <ul style="list-style-type: none"> • CLI: 7.40.1 • NETCONF: 7.3.2, 7.315, 7.4.2, 7.5.2, 7.6, 7.7.1 <p>Cisco IOS:</p> <ul style="list-style-type: none"> • CLI: 6.77.9 	
<p>Cisco NSO Transport-SDN Function Pack (mandatory)</p> <p>Consists of the following function packs:</p> <ul style="list-style-type: none"> • SR-TE Core Function Pack (CFP) is a productized and supported implementation of SR-TE automation. • Cisco NSO Example Function Packs provide example implementations as a starting point for Layer 2 and Layer 3 VPN service provisioning functionality in Crosswork Network Controller. The intention is for customers to work with a Cisco Customer Experience representative to adapt these sample function packs to their specific networks and requirements. 	4.1.0	Cisco NSO Transport SDN Function Pack Bundle 4.0.0 Installation Guide Cisco NSO Transport SDN Function Pack Bundle 4.0.0 User Guide
<p>Cisco NSO Device Lifecycle Management (DLM) Service Pack (mandatory)</p> <p>Installed on a Cisco NSO instance in order to synchronize device configurations in Cisco Crosswork with those in Cisco NSO. It effectively channels communication between the Crosswork DLM and Cisco NSO.</p>	4.4.0	Cisco Network Services Orchestrator DLM Service Pack 4.3.0 Installation Guide

Components	Version	Installation Details
<p>Cisco Crosswork NSO Telemetry Traffic Collector Function Pack (mandatory)</p> <p>Cisco Crosswork Telemetry Traffic Collector Function Pack is installed on the Cisco NSO platform and is used to push services and network configurations to the devices. It utilizes Cisco NSO Reactive FastMap (RFM) nano services to manage the telemetry configuration on devices. This is primarily used for dial-out MDT collection.</p>	4.4.0-116	Cisco Crosswork NSO Telemetry Traffic Collector Function Pack 4.4.0-116 Installation Guide
<p>Cisco Crosswork Change Automation NSO Function Pack (optional, only if you have installed Crosswork Change Automation)</p> <p>Cisco Crosswork Change Automation Function Pack enables a special access user to connect to Cisco NSO for all the configuration management operations performed during the execution of a Change Automation Playbook.</p>	4.4.0	Cisco Crosswork Change Automation NSO Function Pack 4.3.0 Installation Guide

High-level Installation Workflow

This section provides the high-level procedure for installing Cisco Crosswork Network Controller.

Before you begin:

Ensure that the installation requirements are met. For more information, see [Installation Requirements for Cisco Crosswork Network Controller Components](#), on page 2.

Table 4: High-level Installation Workflow

Step	Action	Procedure
1	Ensure that you have installed Cisco NSO, Cisco NEDs, and the applicable function packs.	Installation Requirements for Cisco Crosswork Network Controller Components , on page 2
2	(Optional) Configure Cisco NSO Layered Service Architecture if you have a very large network. For more information about NSO LSA, see NSO Layered Service Architecture documentation .	(Optional) Set up Cisco NSO Layered Service Architecture

Step	Action	Procedure
3	<p>Install the Cisco Crosswork cluster on your preferred datacenter platform (VMware or AWS EC2), and check that all the cluster nodes are up and running.</p> <p>Note Crosswork deployment on AWS EC2 is only available as a limited-release deployment. Please contact the Cisco Product Management team for assistance.</p>	Install the Crosswork Cluster
4	<p>Navigate to cisco.com and locate the Application CAPP files (.tar.gz) that you require.</p> <p>Note In 4.0 release, the Crosswork Network Controller solution is bundled as Essentials and Advantage packages. For more information, see the Cisco Crosswork Network Controller, on page 1 overview.</p> <p>Download the CAPP files to a server that can be reached from Crosswork, and validate them from a linux-based machine.</p>	Install Crosswork Applications
5	Install the Cisco Crosswork cluster on your preferred datacenter platform (VMware or AWS EC2).	Install the Crosswork Data Gateway.
6	Add Cisco NSO to Crosswork as a provider to configure the network devices.	Add Cisco NSO Providers
7	If not already in place, add the Cisco Segment Routing Path Computation Elements (Cisco SR-PCE) to the network.	Configure the Segment Routing Path Computation Element
8	Add the Cisco SR-PCE as a provider to enable Cisco Crosswork application access to an SR-PCE as an SDN controller.	Add the Cisco SR-PCE Providers
9	Get up and running post-installation.	Setup Workflow

High-level Upgrade Workflow

This section provides the high-level procedure for upgrading to Cisco Crosswork Network Controller 4.1. This includes upgrading the Crosswork cluster, Crosswork Data Gateway, and Crosswork Applications, within a single maintenance window.

The time taken to complete the entire upgrade can vary based on size of your deployment profile and the performance characteristics of your hardware.

Limitations:

- Third-party device configuration in Device Lifecycle Management (DLM) and Cisco NSO are not migrated, and need to be re-applied on the new Cisco Crosswork version post migration.

- Custom user roles (Read-Write/Read) created in previous version of Cisco Crosswork Network Controller are not migrated, and need to be updated manually on the new version post migration.
- Crosswork Health Insights KPI alert history is not retrieved as part of the migration.

Table 5: High-level Upgrade Workflow

Step	Action	Procedure
1	Shut down the Cisco Crosswork Data Gateway VMs. Note When the Crosswork Data Gateway VMs are shut down, the data and traps will be not collected or forwarded to data destinations. Check with the application providers to determine if any steps are needed to avoid alarms or other problems.	Shut Down the Cisco Crosswork Data Gateway VMs
2	Create a backup when upgrading your Cisco Crosswork to a new software version. Note We recommend that you create a backup only during a scheduled upgrade window. Users should not attempt to access Cisco Crosswork while the backup operation is running.	Create Backup and Shut Down Cisco Crosswork
3	Install the Crosswork network infrastructure cluster and check that all the cluster nodes are up and running.	Install the Cisco Crosswork 4.4 Cluster
4	While the cluster installation is in progress, upgrade Cisco NSO and install the function packs. Note Crosswork Network Controller 4.1 supports standard NSO and Layered Service Architecture (LSA) NSO, however, the upgrade from standard NSO to LSA NSO is not supported.	Upgrade Cisco NSO to version 5.7.6
5	Upgrade the SR-PCE version to 7.7.1.	For more details, see the supported SR-PCE documentation .

Step	Action	Procedure
6	<p>Navigate to cisco.com and locate the Application CAPP files (.tar.gz) that you require.</p> <p>In 4.1 release, the Crosswork Network Controller solution is bundled as Essentials and Advantage packages. For more information, see the Cisco Crosswork Network Controller, on page 1 overview.</p> <p>Download the CAPP files to a server that can be reached from Crosswork, and validate them from a linux-based machine.</p> <p>Note You are recommended to download and validate the application CAPP files before starting the actual upgrade process. This will reduce your system downtime as opposed to downloading the CAPP files midway through the upgrade process.</p>	Install Crosswork Applications
7	After successfully installing Crosswork Network Controller 4.1 applications, migrate the backup of previous version of Cisco Crosswork to the Cisco Crosswork 4.4 cluster.	Migrate the previous Cisco Crosswork backup to Cisco Crosswork 4.4
8	Manually update all the custom user roles (Read-Write/Read) that were created in the previous version of Cisco Crosswork.	Manage Users
9	<p>Install the Cisco Crosswork Data Gateway 4.1.</p> <p>Note This procedure is required only for a Cisco Crosswork Data Gateway Base VM upgrade. Upgrade of other components, such as collectors, is performed by Cisco Crosswork.</p>	Upgrade to Cisco Crosswork Data Gateway 4.1
10	After the upgrade is completed, check the health of the new cluster and all the installed applications.	Post-upgrade Checklist

