



Implement Disaster Recovery

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Overview

Disaster recovery adds another layer of redundancy to safeguard against network downtime. It responds to a cluster failure by handing off network management duties to a connected cluster (referred to as a site going forward). Cisco DNA Center's disaster recovery implementation consists of three components: the main site, the recovery site, and the witness site. At any given time, the main and recovery sites are operating in either the active or standby role. The active site manages your network while the standby site maintains a continuously updated copy of the active site's data and managed services. Whenever an active site goes down, Cisco DNA Center automatically initiates a failover, completing the tasks necessary to designate the former standby site as the new active site.

Refer to the topics in this chapter for a description of how to set up and use disaster recovery in your production environment.

Key Terms

The following terms are key for understanding Cisco DNA Center's disaster recovery implementation:

- **Main Site:** The first site you configure when setting up your disaster recovery system. By default, it operates as the active site that manages your network. For information on how to configure the sites in your system, see [Configure Disaster Recovery, on page 14](#).
- **Recovery Site:** The second site you configure when setting up your disaster recovery system. By default, it acts as your system's standby site.

- **Witness Site:** The third site you configure when setting up your disaster recovery system. This site, which resides on a virtual machine or separate server, is not involved with the replication of data or managed services. Its role is to give the current active site the quorum it needs to carry out disaster recovery tasks. In the event that a site fails, this prevents the split brain scenario from taking place. This scenario can occur in a two-member system when the sites cannot communicate with each other. Each site believes that it should become active, creating two active sites. Cisco DNA Center uses the witness site to arbitrate between the active and standby sites, allowing only one active site at any given time. For a description of witness site requirements, see [Prerequisites, on page 6](#).
- **Register:** To add a site to a disaster recovery system, you must first register it with the system by providing information such as your main site's VIP. When registering your recovery or witness site, you will also need to provide the token that is generated when you register your main site. For more information, see [Configure Disaster Recovery, on page 14](#).
- **Configure Active:** The process of establishing a site as the active site, which involves tasks such as exposing the appropriate managed service ports.
- **Active site:** The site that is currently managing your network. Cisco DNA Center continuously replicates its data to your standby site.
- **Configure Standby:** The process of establishing a site as the standby site, which involves tasks such as configuring the replication of the active site's data and disabling the services which manage the network on the standby site.
- **Standby Ready:** When an isolated site meets the prerequisites to become a standby site, Cisco DNA Center moves it to this state. To establish this site as your system's standby site, click **Rejoin** in the **Action** area.
- **Standby site:** The site that maintains an up-to-date copy of your active site's data and managed services. In the event that your active site goes down, your system initiates a failover and your standby site takes over as the active site.



Note After a failover, Assurance restarts and processes a fresh set of data on the new active site. Historical Assurance data from the former active site is not migrated over.

- **Failover:** Cisco DNA Center supports two types of failover:
 - **System-triggered:** As soon as Cisco DNA Center recognizes that your active site has gone down, it automatically carries out the tasks required to establish your standby site as the new active site. You can monitor these tasks from the [Monitor the Event Timeline](#).
 - **Manual:** You can initiate a manual failover to designate the current standby site as the new active site. For more information, see [Initiate a Manual Failover, on page 29](#).



Note After a failover, the Cisco DNA Center inventory service triggers a full device sync. This can take anywhere from a few minutes to a few hours, depending on the number of devices that are managed. As is the case when Cisco DNA Center's normally scheduled device sync is running, you will not be able to provision devices on the newly activated cluster until the device sync triggered by a failover completes.

- **Isolate:** During a failover, the former active site is separated from the disaster recovery system. Cisco DNA Center suspends its services and stops advertising its virtual IP address (VIP). From here, Cisco DNA Center completes the tasks necessary to establish the former standby site as the new active site.
- **Pause:** Temporarily suspend your disaster recovery system in order to separate the sites that make up your system and stop data and service replication. For more information, see [Pause Your Disaster Recovery System, on page 32](#).
- **Rejoin:** From the **Disaster Recovery > Monitoring** tab, click this button in the **Action** area in order to add a Standby Ready or Paused site back into a disaster recovery system as the new standby site (after a failover has taken place). You would also click this button in order to restart a disaster recovery system that is currently paused.
- **Activate DR:** User-initiated operation that creates your system's active and standby sites. This operation entails setting up intracluster communication, verifying that the sites meet disaster recovery prerequisites, and replicating data between the two sites.
- **Deregister:** Click this button in the **Action** area to remove the three sites you have configured for your disaster recovery system. You must do so in order to make changes to any of the site settings you have entered previously.
- **Retry:** In the **Action** area, click this button in order to reinitiate any action that failed previously.

Data Replication Overview

The data replication process syncs data between your disaster recovery system's main site and recovery site. Its duration will depend on a few factors: the amount of data that needs to be replicated, your network's effective bandwidth, and the amount of latency that exists between the main and recovery sites. When disaster recovery is active for your Cisco DNA Center deployment, data replication will *not* impact any operations or application use on the current active site (which is managing your network).

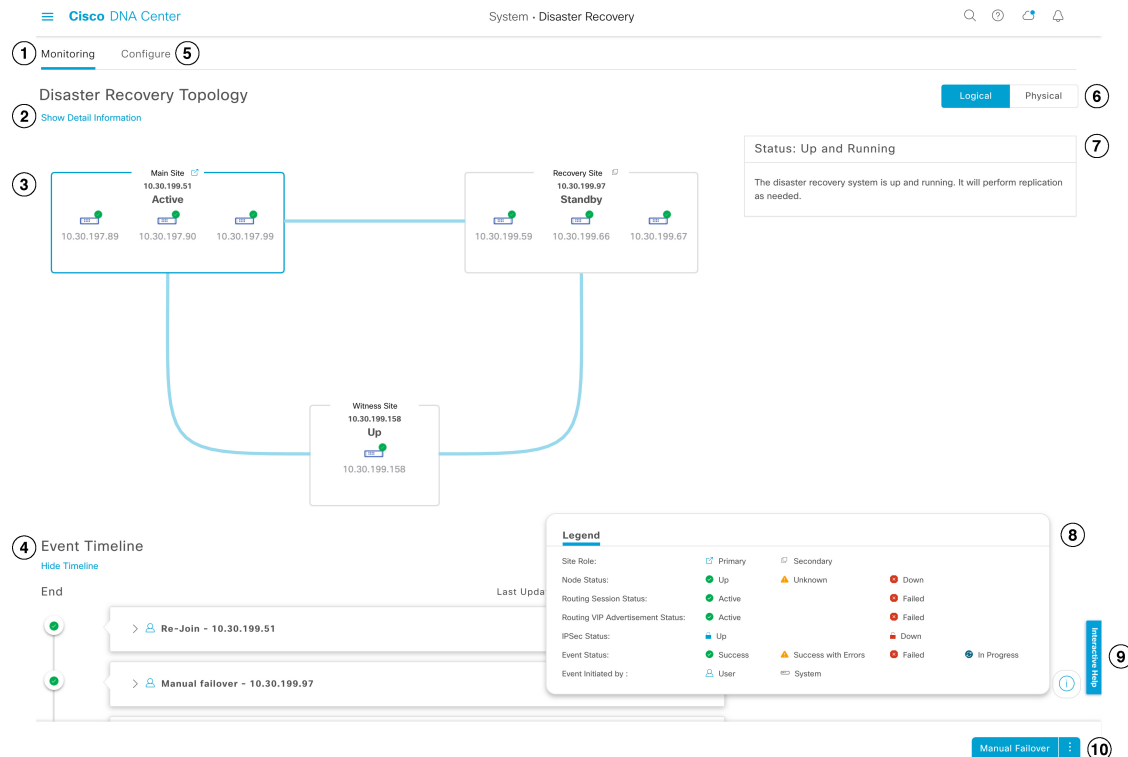
Either a full or incremental replication of data takes place, depending on which of the following scenarios is applicable:

- **After initial activation:** After the initial configuration and activation of your disaster recovery system, the recovery site does not have any data. In this scenario, a full replication of data between the main and recovery sites happens.
- **After a failover:** Whenever the current active site fails, the disaster recovery system triggers a failover. In this scenario, a full data replication between the main and recovery sites occurs after the failed site rejoins the system.

- **During normal operation:** This is the scenario that will typically apply to your system. During its day-to-day operation, changes that take place on the current active site are continuously synced with the current standby site.

Navigate the Disaster Recovery GUI

The following table describes the components that make up Cisco DNA Center's disaster recovery GUI and their function.



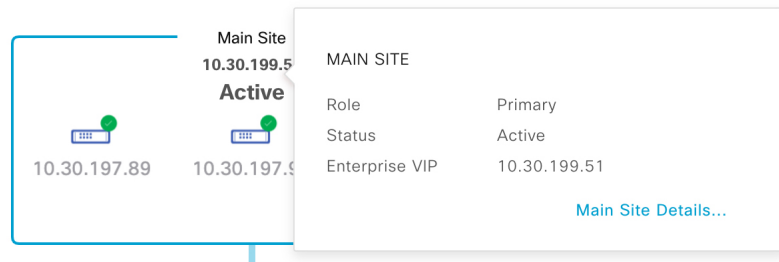
Callout	Description
1	Monitoring tab: Click to do the following: <ul style="list-style-type: none"> • View a topology of the sites that make up your system. • Determine the current status of your system. • Perform disaster recovery tasks. • View a listing of the tasks that have been completed to date.
2	Show Detail Information link: Click to open the Disaster Recovery System slide-in pane. See View Disaster Recovery System Status, on page 5 for more information.

Callout	Description
3	<p>Topology: Displays either a logical or physical topology of your system that indicates the current status of your sites and their members.</p> <ul style="list-style-type: none"> • In both the logical and physical topologies, a blue box indicates the site that's currently acting as your system's active site. • In the logical topology, a blue line indicates that the IPSec tunnel connecting two sites is operational, and a red line indicates that the tunnel is currently down. • To view a description of the possible site states, see System and Site States, on page 25.
4	<p>Event Timeline: Lists every disaster recovery task that is currently in progress or has been completed for your system. For more information, see Monitor the Event Timeline, on page 23.</p>
5	<p>Configure tab: Click to enter the settings necessary to establish a connection between your disaster recovery system's sites. See Configure Disaster Recovery, on page 14 for more information.</p>
6	<p>Logical and Physical tabs: Click the appropriate tab to toggle between a logical and physical topology of your system.</p>
7	<p>Status area: Indicates the current status of your system. To view a description of the possible system states, see System and Site States, on page 25.</p>
8	<p>Legend: Indicates what the topology icons represent. To view the legend, click ⓘ in the bottom right corner of the Disaster Recovery page.</p>
9	<p>Interactive Help button: Click to open a slide-in pane that provides links to walkthroughs that provide on-screen guidance to help you complete specific tasks in Cisco DNA Center.</p>
10	<p>Action area: Displays the disaster recovery tasks that are currently available for you to initiate. The tasks you can choose from vary, depending on whether you have configured your sites and your system's status.</p>

View Disaster Recovery System Status

The topology provides a graphical representation of your disaster recovery system's current status. If you want to view this information in a tabular format, you can do so in the **Disaster Recovery System** slide-in pane. To open this pane, do one of the following:

- Click the **Show Detail Information** link. Then expand the site whose status you want to view in the slide-in pane.
- In the topology, place your cursor over a site's Enterprise virtual IP address or a particular node's icon. In the popup window that opens, click the link in the bottom right-hand corner of the window.



The slide-in pane opens with the relevant site's information displayed.

Disaster Recovery System

Status Up and Running

Main Site

Role	Primary
Status	Active
Enterprise VIP	10.30.199.51

IPSEC STATUS

Tunnel Main-Recovery	Up
Tunnel Main-Witness	Up

NODE

	Node 1	Node 2	Node 3
Status	Up	Up	Up
Enterprise IP	10.30.197.89	10.30.197.90	10.30.197.99
Cluster IP	29.30.197.89	29.30.197.90	29.30.197.99

Prerequisites

Before you enable disaster recovery in your production environment, ensure that the following prerequisites have been met.



Important

- If you plan to upgrade to Cisco DNA Center 2.2.3, you will need to complete a few steps in order to ensure that disaster recovery works properly after the upgrade. See [Configure Disaster Recovery on an Upgraded Cisco DNA Center Appliance, on page 9](#) for more information.
- Note that disaster recovery does not support IPv6.

General Prerequisites

- Cisco DNA Center supports two disaster recovery setups:
 - **1+1+1 setup:** One Cisco DNA Center appliance functions as your Main Site, a second appliance serves as your Recovery Site, and a third system (residing on a virtual machine) acts as your Witness Site. The following appliances and versions support this setup:
 - DN1-HW-APL/DN2-HW-APL (44-Core appliance): Cisco DNA Center 2.2.2.x and later
 - DN2-HW-APL-L (56-Core appliance): Cisco DNA Center 2.2.1.x and later
 - DN2-HW-APL-XL (112-Core appliance): Cisco DNA Center 2.2.1.x and later
 - **3+3+1 setup:** One three-node Cisco DNA Center cluster functions as your Main Site, a second three-node cluster serves as your Recovery Site, and a third system (residing on a virtual machine) acts as your Witness Site. The following appliances and versions support this setup:
 - DN1-HW-APL/DN2-HW-APL (44-Core appliance): Cisco DNA Center 2.2.2.x and later
 - DN2-HW-APL-L (56-Core appliance): Cisco DNA Center 2.1.2.x and later
 - DN2-HW-APL-XL (112-Core appliance): Cisco DNA Center 2.1.2.x and later
- You have configured a VIP for the Enterprise port interface on your Cisco DNA Center appliances. This is required because disaster recovery uses the Enterprise network for intrasite communication. In the [Cisco DNA Center Second-Generation Appliance Installation Guide](#), refer to the following:
 - For more information about the Enterprise port, see the "Interface Cable Connections" topic.
 - For more information about Enterprise port configuration, see either the "Configure the Primary Node Using the Maglev Wizard" or "Configure the Primary Node Using the Advanced Install Configuration Wizard" topic.
- You have assigned a super-admin user to carry out disaster recovery tasks. Only users with this privilege level can access this functionality.
- You have confirmed that the links connecting the following sites are one GB links with 350 ms RTT latency (at most).
 - Main and recovery sites
 - Main and witness sites
 - Recovery and witness sites
- You have generated one third-party certificate and installed this certificate on both the main and recovery sites. Otherwise, site registration will fail.



Note Cisco DNA Center copies this certificate to the witness site automatically during the registration process.

Ensure that all of the IP addresses and fully qualified domain names (**FQDN**) that the main and recovery sites use are included in this certificate. Also ensure that **digitalSignature** is specified for the certificate's **keyUsage** parameter. For a description of how to generate a third-party certificate, see [Generate a Certificate Request Using Open SSL](#) in the *Cisco DNA Center Security Best Practices Guide*.

- You have opened all of the ports listed in the [Cisco DNA Center Security Best Practices Guide's "Disaster Recovery Ports"](#) topic.
- If you are using an FQDN-only certificate, ensure that the same **cluster_hostname**—that is, the FQDN for Cisco DNA Center (set in the Cisco DNA Center configuration wizard)—is configured on both the main and recovery sites, as well as disaster recovery's VIP.

Main and Recovery Site Prerequisites

- Both your main and recovery site must consist of the same number of nodes. Cisco DNA Center will not allow you to register and activate a disaster recovery system that does not meet this requirement.
- Both your main and recovery site must consist of Cisco DNA Center appliances that have the same number of cores. This means that one site cannot consist of 56-core second-generation appliances while the other site consists of 112-core appliances. The following table lists the appliances that support disaster recovery and their corresponding Cisco part number:

Supported Cisco DNA Center Appliances	Cisco Part Numbers
First and second generation 44-core appliance	<ul style="list-style-type: none"> • DN1-HW-APL • DN1-HW-APL-U • DN2-HW-APL • DN2-HW-APL-U
Second generation 56-core appliance	<ul style="list-style-type: none"> • DN2-HW-APL-L • DN2-HW-APL-L-U
Second generation 112-core appliance	<ul style="list-style-type: none"> • DN2-HW-APL-XL • DN2-HW-APL-XL-U

Also ensure that your main and recovery site are running the same Cisco DNA Center version.

- You have configured and enabled high availability (HA) on both your main and recovery site. Otherwise, the registration of these sites will fail. For more information, see the latest [Cisco DNA Center High Availability guide](#).



Important This is applicable to three-node setups only.

- If you want to use Border Gateway Protocol (BGP) to advertise your system's virtual IP address routes, you need to configure your system's Enterprise virtual IP address on each of the main and recovery site's neighbor routers. The configuration you need to enter will look similar to one the following examples:

Interior BGP (iBGP) Configuration Example

```
router bgp 64555
  bgp router-id 10.30.197.57
  neighbor 172.25.119.175 remote-as 64555
  neighbor 172.25.119.175 update-source 10.30.197.57
  neighbor 172.25.119.175 next-hop-self
```

where:

- 64555 is the neighbor router's local and remote AS number.
- 10.30.197.57 is the neighbor router's IP address.
- 172.25.119.175 is your system's Enterprise virtual IP address.

Exterior BGP (eBGP) Configuration Example

```
router bgp 62121
  bgp router-id 10.30.197.57
  neighbor 172.25.119.175 remote-as 64555
  neighbor 172.25.119.175 update-source 10.30.197.57
  neighbor 172.25.119.175 next-hop-self
  neighbor 172.25.119.175 ebgp-multihop 255
```

where:

- 62121 is the neighbor router's local AS number.
- 64555 is the neighbor router's remote AS number.
- 10.30.197.57 is the neighbor router's IP address.
- 172.25.119.175 is your system's Enterprise virtual IP address.
- If you enable BGP route advertisement (as described in the previous bullet), we recommend that you filter routes towards Cisco DNA Center in order to improve its performance. To do so, enter the following configuration:

```
neighbor system's-Enterprise-virtual-IP-address route-map DENY_ALL out
!
ip prefix-list DENY_ALL seq 5 deny 0.0.0.0/0 le 32
!
route-map DENY_ALL permit 10
match ip address prefix-list DENY_ALL
```

Witness Site Prerequisites

- You have confirmed that the virtual machine that hosts your witness site is running (at a minimum) VMware ESXi hypervisor version 7.0 or later with a 2.1-GHz core and two virtual CPUs, 4 GB of RAM, and 10 GB of hard drive space.
- Witness site deployment in a public cloud is not supported.
- You have set up your witness site in a different location than your main and recovery sites and confirmed that it is reachable from both of these sites.
- You have configured an NTP server that is accessible by the witness site. You must synchronize this NTP server with the NTP servers that are used by the main and recovery sites.

Configure Disaster Recovery on an Upgraded Cisco DNA Center Appliance

To successfully configure disaster recovery after upgrading your system to the latest Cisco DNA Center 2.2.3.x version, complete the steps that are applicable to your situation:

Scenario 1

In this scenario, the first Cisco DNA Center version installed on your appliances was a version previous to 2.1.x. Now you want to upgrade to 2.2.3.x from 2.1.x. Complete the following steps to ensure that disaster recovery functions properly after the upgrade.



Note To enable disaster recovery without having to reinstall Cisco DNA Center (described in Step 3 of the following procedure), you'll need to upgrade to version 2.3.3.7 or later.

-
- Step 1** On your appliances, upgrade from your current Cisco DNA Center version to 2.2.3.x (see the [Cisco DNA Center Upgrade Guide](#)).
 - Step 2** Back up your data (see [Back Up Data Now](#)).
Ensure that your backup file resides on a remote server, as the next step will completely erase the data on your appliances and virtual machine.
 - Step 3** Install the Cisco DNA Center 2.2.3.x ISO image onto your appliances (see the "Reimage the Appliance" topic in the [Cisco DNA Center Second-Generation Appliance Installation Guide](#)).
 - Step 4** Restore the data from your backup file (see [Restore Data from Backups](#)).
 - Step 5** Proceed with the configuration of your disaster recovery system.
-

Scenario 2

In this scenario, the first Cisco DNA Center version installed on your appliances was an earlier 2.1.x version and now you want to upgrade to 2.2.3. Complete the following steps:

-
- Step 1** [Install the Witness Site, on page 12.](#)
 - Step 2** [Configure Disaster Recovery, on page 14.](#)
-

Add the Disaster Recovery Certificate

Cisco DNA Center supports the import and storage of an X.509 certificate and private key into Cisco DNA Center. The disaster recovery certificate is used for intracluster communications.

You must obtain a valid X.509 certificate that is issued by your internal CA and the certificate must correspond to a private key in your possession.

**Note**

- If you want your disaster recovery system to use the same certificate that Cisco DNA Center uses, you can skip this procedure. When you configure the certificate, make sure that you check the **Use system certificate for Disaster Recovery as well** check box (see [Update the Cisco DNA Center Server Certificate](#)).
- For more information about the disaster recovery certificate requirements, reference the [Security Best Practices Guide](#).

Step 1 In the Cisco DNA Center GUI, click the **Menu** icon (≡) and choose **System > Settings > Trust & Privacy > Certificates > Disaster Recovery**.

Step 2 In the **Add Certificate** area, choose the file format type for the certificate that you are importing into Cisco DNA Center:

- **PEM**: Privacy-enhanced mail file format
- **PKCS**: Public-Key Cryptography Standard file format

Step 3 If you chose **PEM**, perform the following tasks:

a) Import the certificate by dragging and dropping the PEM file into the highlighted area.

Note A PEM file must have a valid PEM format extension (.pem). The maximum file size for the certificate is 10 MB.

After the upload succeeds, the system certificate is validated.

b) In the **Private Key** area, import the private key by dragging and dropping it into the highlighted area.

Note Private keys must have a valid private key format extension (.key). The maximum file size for the private key is 10 MB.

After the upload succeeds, the private key is validated.

c) Specify whether the private key will be encrypted by clicking the appropriate radio button.

d) If the private key will be encrypted, enter its password in the **Password** field.

Step 4 If you chose **PKCS**, perform the following tasks:

a) Import the certificate by dragging and dropping the PKCS file into the highlighted area.

Note A PKCS file must have a valid PKCS format extension (.pfx or .p12). The maximum file size for the certificate is 10 MB.

After the upload succeeds, the system certificate is validated.

b) In the **Password** field, enter the certificate's password (a PKCS requirement).

c) Specify whether the private key will be encrypted by clicking the appropriate radio button.

d) If the private key will be encrypted, enter its password in the **Password** field.

Step 5 Click **Save**.

After the Cisco DNA Center server's SSL certificate is replaced, you are automatically logged out and you must log in again.

Install the Witness Site

Complete the following procedure to set up the virtual machine that will serve as the witness site for your disaster recovery system.

Step 1 Download the OVF package that's specific to the Cisco DNA Center version that the witness site is running:

a) Open <https://software.cisco.com/download/home/286316341/type>.

Note You need a Cisco.com account to access this URL. See the following page for a description of how to create an account: <https://www.cisco.com/c/en/us/about/help/registration-benefits-help.html>

b) In the **Select a Software Type** area, click the Cisco DNA Center software link.

The **Software Download** page updates, listing the software that's available for the latest Cisco DNA Center release.

c) Do one of the following:

- If the OVF package (*.ova) you need is already listed, click its **Download** icon.
- Enter the relevant version number in the **Search** field, click its link in the navigation pane, and then click the **Download** icon for that version's OVF package.

Step 2 Copy this package to a local machine running VMware vSphere 7.0 or later.

Step 3 From the vSphere client, choose **File > Deploy OVF Template**.

Step 4 Complete the **Deploy OVF Template** wizard:

a) Do the following in the wizard's **Source** screen:

1. Click **Browse**.
2. Navigate to the witness site's OVF package (.ova).
3. Click **Open**.
4. In the **Deploy from a file or URL** field, verify that the package's path is displayed and then click **Next >**.

The wizard's **OVF Template Details** screen opens.

b) Click **Next >**.

c) Do the following in the wizard's **Name and Location** screen:

- In the **Name** field, enter the name you want to set for the package.
- In the **Inventory Location** field, select the folder that you want the package to reside in.
- Click **Next >**.

The wizard's **Host/Cluster** screen opens.

- d) Click the host or cluster on which you want to run the deployed template and then click **Next >**.

The wizard's **Storage** screen opens.

- e) Click the storage drive that the virtual machine files will reside on and then click **Next >**.

The wizard's **Disk Format** screen opens.

- f) Click the **Thick Provision** radio button and then click **Next >**.

- g) Do the following in the wizard's **Network Mapping** screen and then click **Next >**:

1. Click the IP address that is listed in the **Destination Networks** column.
2. In the resulting drop-down list, choose the network that the deployed template should use.

The wizard's **Ready to Complete** screen opens, displaying all of the settings that you have entered.

- h) Check the **Power on after deployment** check box and then click **Finish**.

- i) When the **Deployment Completed Successfully** dialog box appears, click **Close**.

Step 5

Enter the network settings for your witness site:

- a) Open a console to the virtual machine you just created by doing one of the following:
- Right-click the virtual machine from the vSphere Client list and choose **Open Console**.
 - Click the **Open Console** icon in the vSphere Client menu.

The **Witness User Configuration** window appears.

- b) Enter and confirm the desired password for the admin user (*maglev*), then press **N** to proceed.
- c) Enter the following settings, then press **N** to proceed:

- Its IP address
- The netmask associated with the virtual machine's IP address
- The IP address of your default gateway
- **(Optional)** The IP address of the preferred DNS server

- d) Enter one or more NTP server addresses or hostnames (separated by spaces), then press **S** to submit your settings and begin the configuration of the witness site.

At least one NTP address or hostname is required.

- e) Verify that configuration has completed by using SSH port 2222 to log in to the IP address you configured for the witness site.

Note Later, if you need to change the password configured for the **maglev** user on the witness site's VM, use the standard Linux **passwd** utility. You don't need to pause the disaster recovery system before doing this, and the password change will have no functional impact on disaster recovery operation.

Configure Disaster Recovery

To configure your disaster recovery system for use, complete the tasks described in the following procedure.



Note When configuring your system, you have a couple of options:

- You can specify a virtual IP address that uses Border Gateway Protocol (BGP) route advertising.
- You can choose to not configure a virtual IP address. If you choose this option, you must enable device controllability so that a site's virtual IP address can be reconfigured after a failover occurs. For more information, see [Device Controllability](#).

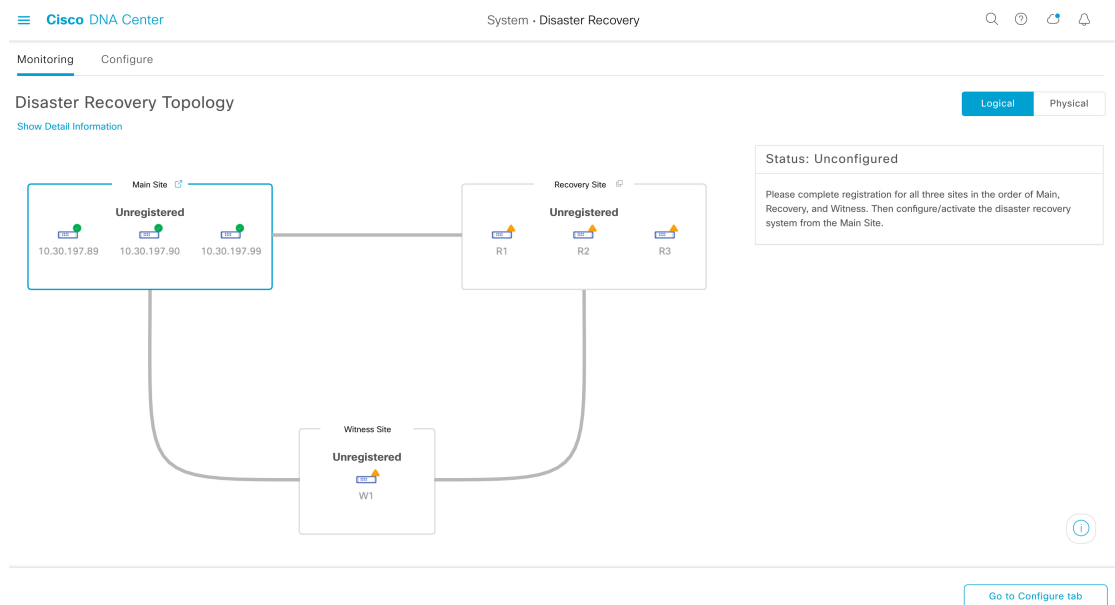
Before you begin

Assurance data (Elasticsearch) and your deployment's backup schedule is not replicated after a failover. For the clusters where your disaster recovery system's main and recovery sites will reside, do the following *before* configuring your system:

- Configure a separate NFS device for each site.
- Configure the same backup schedule.

Step 1

In the Cisco DNA Center GUI, click the **Menu** icon () and choose **System > Disaster Recovery** to open the **Disaster Recovery** page.



The **Monitoring** tab is selected, by default.

Step 2

Register your main site:

a) Click the **Configure** tab.

The **Main Site** radio button should already be selected.

Cisco DNA Center System - Disaster Recovery

Monitoring **Configure**

Set up this cluster to be the ☒ Main Site ☐ Recovery Site

Convert the cluster VIPs to the disaster recovery VIPs >

☒ Yes ☐ No

▲ Reverting to the original state after cluster VIPs are promoted is a lengthy process involving manual steps. Make sure that the replacement VIP addresses are unique and are in the same enterprise and management subnets as the original VIPs respectively.

Turn the cluster enterprise VIP, 10.30.199.51, to the disaster recovery enterprise VIP

New main site enterprise VIP*

Enter replacement enterprise VIP of main site

☒ Turn the cluster management VIP, 192.192.199.78, to the disaster recovery management VIP

New main site management VIP*

Enter replacement management VIP of main site

Promote

b) In the **Convert the cluster VIPs to the disaster recovery VIPs** area, click one of the following radio buttons:

- Click **Yes** to set up a cluster as the main site and automatically propagate virtual IP address changes to the devices that are connected to this cluster. This is accomplished by promoting the virtual IP addresses that are currently configured for the cluster and assigning them as your disaster recovery system's global virtual IP addresses. We recommend choosing this option if you are enabling disaster recovery on a cluster that has a lot of connected devices. Otherwise, these devices will need to be reconfigured to communicate with the new disaster recovery virtual IP address. If you choose this option, do the following:
 1. In the **New main site enterprise VIP** field, enter a new virtual IP address for the site's Enterprise network. This will replace the address that is going to be promoted. Ensure that it is a unique address that is not already used and that it resides in the same subnet as the previous virtual IP address.
 2. (Optional) Check the **Turn the cluster management VIP, <IP-address>, to the disaster recovery management VIP** check box.
 3. (Optional) In the **New main site management VIP** field, enter a new virtual IP address for the site's Management network. This will replace the address that is going to be promoted. Ensure that it is a unique address that is not already used and that it resides in the same subnet as the previous virtual IP address.
- Click **No** to set up a cluster as the main site without propagating virtual IP address changes to connected devices. We recommend this option for a brand-new cluster that isn't connected to any devices yet or is only connected to a few devices. If you choose this option, skip ahead to Step 2f.

c) In the **Action** area, click **Promote**.

The **Disaster Recovery VIP Promotion** dialog opens.

d) Click **Continue**.

Cisco DNA Center validates the virtual IP addresses you entered.

- e) In the **Details** area, view the validation status:
- If any of the addresses you entered are invalid (likely because it doesn't reside in the same subnet as the address it's replacing), make the necessary corrections and repeat Step 2c.
 - If the addresses you entered are successfully validated, the **Details** area lists all of the virtual IP addresses that will be configured for your disaster recovery system. Proceed to the next step.
- f) Enter the following information in the **Site VIP/IPs** area:
- **Main Site VIP:** The virtual IP address that manages traffic between the active site's cluster nodes and your Enterprise network. Cisco DNA Center prepopulates this field, based on your system's information.
 - **Recovery Site VIP:** The Enterprise virtual IP address that manages traffic between the recovery site's cluster nodes and your Enterprise network.
 - **Witness Site IP:** The IP address that manages traffic between the witness site's virtual machine and your Enterprise network.

Important Ensure that the addresses you enter are currently reachable. Otherwise, the registration of your system's sites will fail.

Note At any point between Steps 2f and Step 2j, you can click **Reset** to clear all of the settings that you have entered. You will then need to repeat Step 2f and enter the correct settings before you register the main site.

- g) Click one of the following radio buttons in the **Route advertisement** area:
- **Border Gateway Protocol (BGP):** This option, which is recommended for most disaster recovery systems, is selected by default. BGP route advertisement ensures that you can access your system's current active site, which is critical after a failover takes place.
 - **Disaster recovery VIPs without route advertisement:** Choose this option if you want to configure virtual IP addresses for your system whose routes are not advertised using BGP. This option is suitable for data centers where both the main and recovery sites can access the subnet that the system's global virtual IP addresses reside within.
 - **No disaster recovery VIPs:** When this option is selected, the virtual IP addresses that are configured for a site are automatically configured on the devices that belong to that site. Each time a failover takes place, these virtual IP addresses are reconfigured on the devices. Skip ahead to Step 2k.

- h) If you clicked either of the first two radio buttons in the previous step, enter a value in the **Enterprise VIP for Disaster Recovery** field.

When configured, this floating virtual IP address automatically moves to and operates on the site that is currently acting as your network's active site. This address manages traffic between your disaster recovery system and your Enterprise network.

Note

- If you clicked the **Border Gateway Protocol (BGP)** radio button and don't want to configure a Management virtual IP address, skip ahead to Step 2j.
- If you clicked the **Disaster recovery VIPs without route advertisement** radio button and don't want to configure a Management virtual IP address, skip ahead to Step 2k.

- i) (Optional) Enter a value in the **Management VIP for Disaster Recovery** field.

When configured, this floating virtual IP address automatically moves to and operates on the site that is currently acting as your network's active site. This address manages traffic between your disaster recovery system and your Management network.

- j) If you clicked the **Border Gateway Protocol (BGP)** radio button, enter the information required to enable route advertisement:
- In the **Border Gateway Protocol Type** area, specify whether your BGP peers will establish exterior (**Exterior BGP (eBGP)**) or interior (**Interior BGP (iBGP)**) sessions with one another.
 - In the **Main Site Router Settings for Enterprise Network** and **Recovery Site Router Settings for Enterprise Network** areas, enter the IP address of the remote router that Cisco DNA Center will use to advertise the Enterprise virtual IP address that's configured for the disaster recovery system's Main and Recovery sites. Also enter the router's remote and local AS numbers.

Note the following points:

- Click the **Add (+)** icon if you want to configure an additional remote router. You can configure a maximum of two routers for each site.
- When entering an AS number, ensure that it's a 32-bit unsigned number that falls within the 1–4,294,967,295 range.
- When the **iBGP** option is selected, Cisco DNA Center will automatically set the local AS number to the value you enter as the remote AS number.
- If you configured a Management virtual IP address in the previous step, the **Main Site Router Settings for Management Network** and **Recovery Site Router Settings for Management Network** areas are also displayed. Enter the appropriate information for the remote router that Cisco DNA Center will use to advertise this virtual IP address.

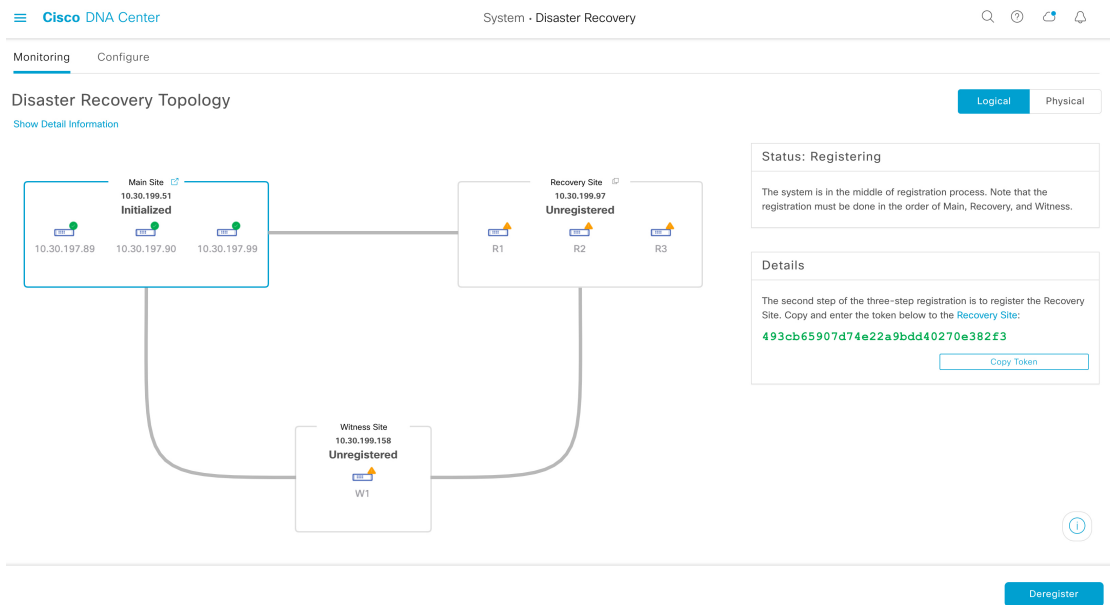
- k) From the **Action** area, click **Register**.

The **Disaster Recovery Registration** dialog opens.

- l) Click **Continue**.

The token that your recovery and witness sites need to use in order to register with your main site is generated.

Step 3 In the **Details** area, click **Copy Token**.

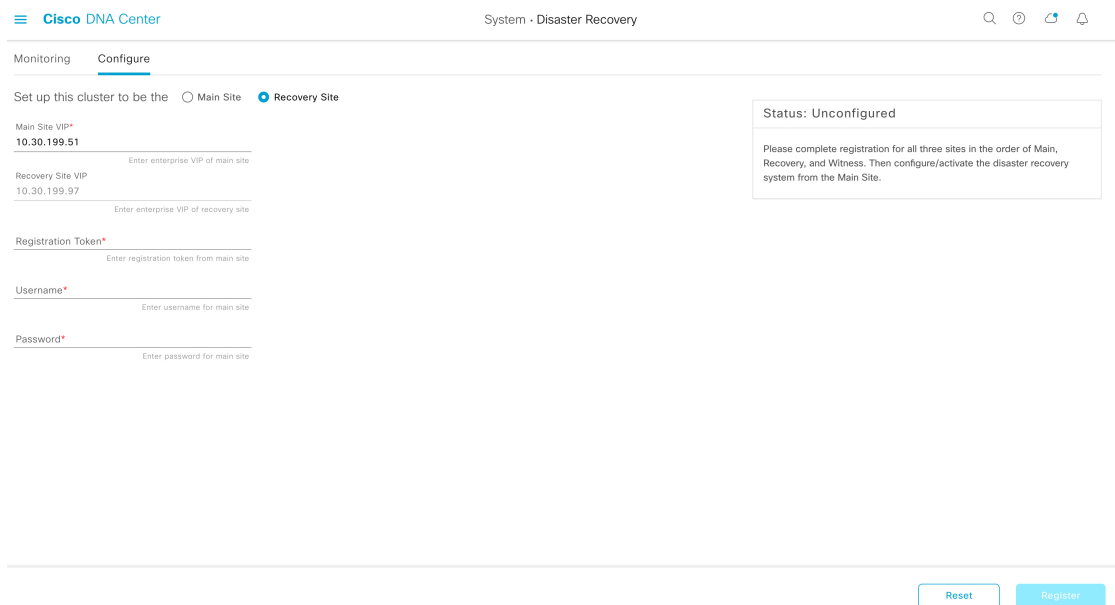


Step 4 Register your recovery site:

Note At any point before Step 4d, you can click **Reset** to clear all of the settings that you have entered. You will then need to repeat Step 4 and enter the correct settings before you register the recovery site.

- From the **Details** area, right-click the **Recovery Site** link and open the resulting page in a new browser tab.
- If necessary, enter the appropriate username and password to log in to your recovery site.

The **Disaster Recovery** page's **Configure** tab opens, with the **Recovery Site** radio button already selected.



- c) Enter the following information:
- **Main Site VIP:** The virtual IP address that manages traffic between the active site's cluster nodes and your Enterprise network.

- **Recovery Site VIP:** The virtual IP address that manages traffic between the recovery site's cluster nodes and your Enterprise network. Cisco DNA Center prepopulates this field, based on your system's information.

Note After a IPSec tunnel has been configured between the main and recovery sites, Enterprise traffic on the node(s) hosting the VIP will be sourced via the Enterprise VIP (UDP/TCP/ICMP).

- The registration token you generated in Step 2.
- The username and password configured for the your active site's super-admin user.

d) From the **Action** area, click **Register**.

The **Disaster Recovery Registration** dialog opens.

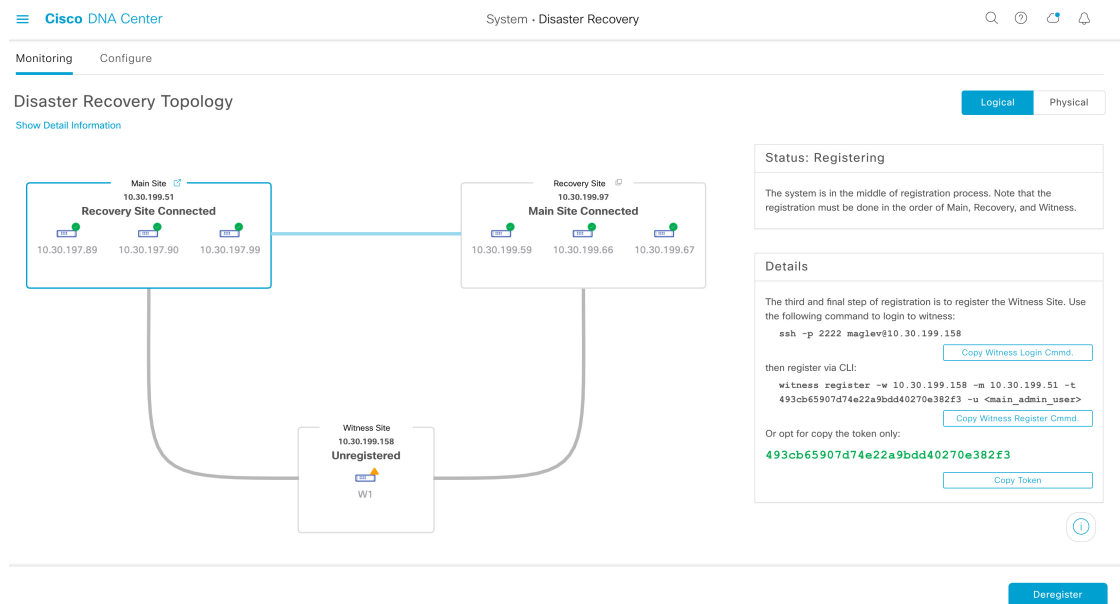
e) Click **Continue**.

The topology updates the status for the main and recovery sites after they have been connected.

Step 5

Register your witness site:

a) Return to the main site's browser tab.

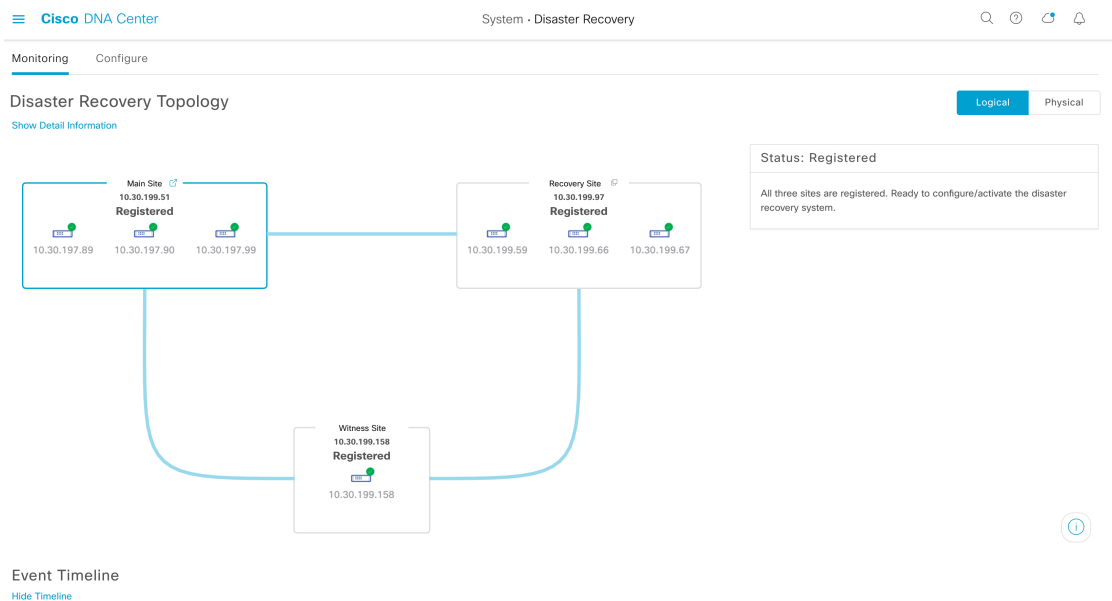


- From the **Details** area, click **Copy Witness Login Cmmnd**.
- Open an SSH console to the witness site, paste the command you just copied, and then run it to log in.
- When prompted, enter the default (maglev) user's password.
- Return to the **Details** area and click **Copy Witness Register Cmmnd**.
- In the SSH console, paste the command you just copied.
- Replace `<main_admin_user>` with the super-admin user's username and then run the command.
- When prompted, enter the super-admin user's password.

Step 6

Verify that your main, recovery, and witness sites have been registered successfully:

a) Return to the main site's browser tab and click **Monitoring** to view the Disaster Recovery **Monitoring** tab.



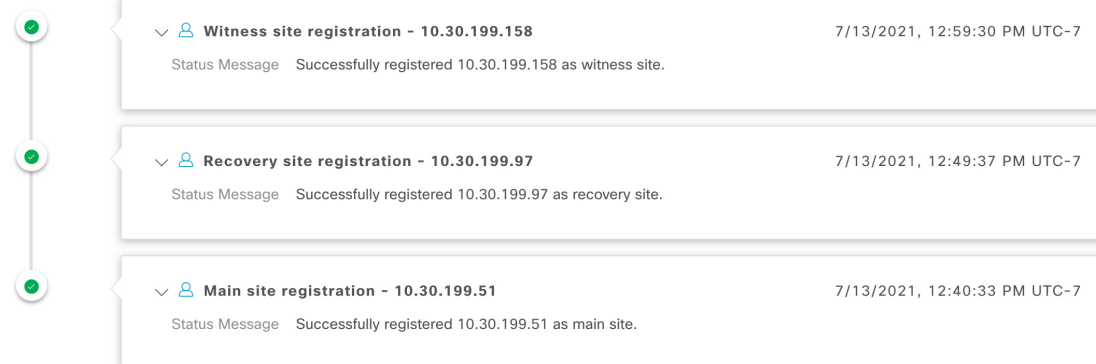
- b) In the **Logical Topology** area, confirm that the three sites are displayed and their status is **Registered**.
- c) In the **Event Timeline** area, confirm that the registration of each site is listed as an event and that each task completed successfully.

Event Timeline

[Hide Timeline](#)

End

Last Update: 7/13/2021, 1:01:51 PM UTC-7



Step 7 In the **Action** area, click **Activate**.

A dialog appears, indicating that all of the data that currently resides in your recovery site will be erased.

Step 8 To begin the configuration of your disaster recovery system and the replication of your main site's data to the recovery site, click **Continue**.

Note The activation process may take some time to complete. View the Event Timeline in order to monitor its progress.

Step 9 After Cisco DNA Center has completed the necessary tasks, verify that your system is operational:

- a. View its topology and confirm that the following status is displayed for your respective sites:



- b. View the Event Timeline and confirm that the **Activate Disaster Recovery System** task completed successfully.

Event Timeline

[Hide Timeline](#)

End

Last Update: 7/13/2021, 1:13:46 PM UTC-7

✓	<p>▼ Activate Disaster Recovery System - 10.30.199.51 7/13/2021, 1:13:39 PM UTC-7</p> <p>Start Time 7/13/2021, 1:03:17 PM UTC-7</p> <p>Status Message Successfully setup disaster recovery</p> <p>End Time 7/13/2021, 1:13:39 PM UTC-7</p> <p>View Details</p>
✓	<p>> Witness site registration - 10.30.199.158 7/13/2021, 12:59:30 PM UTC-7</p>
✓	<p>> Recovery site registration - 10.30.199.97 7/13/2021, 12:49:37 PM UTC-7</p>
✓	<p>> Main site registration - 10.30.199.51 7/13/2021, 12:40:33 PM UTC-7</p>

- c. Verify that your sites are reachable by pinging them from the main site.

Replace the Current Witness Site

Complete the following procedure if you need to upgrade or replace your current witness site.

Step 1

Log in to the current witness site:

- a) Open an SSH console to the witness site and run the `ssh -p 2222 maglev@witness-site's-IP-address` command.

b) Enter the default (maglev) user's password.

Note Before you proceed to the next step, note the witness site's IP address. You'll need to configure the same address after you upgrade the witness site. Otherwise, the witness site won't work as expected.

Step 2 Run the **witness reset** command.

Step 3 Delete the current witness site's virtual machine.

Step 4 Install the new witness site's virtual machine, as described in [Install the Witness Site, on page 12](#).

Step 5 Log in to the new witness site:

- a) Open an SSH console to the witness site and run the **ssh -p 2222 maglev@witness-site's-IP-address** command.
- b) Enter the default (maglev) user's password.

Step 6 Run the **witness reconnect -w witness-site's-IP-address -m main-site's-Enterprise-virtual-IP-address -u admin-username** command.

Note the following points:

- Regardless of the main site's current disaster recovery status, use the main site's Enterprise VIP when reconnecting the witness site.
- To verify that the witness site is operational after running this command, do the following:
 - a. From the Disaster Recovery Topology, click the **Show Detail Information** link to open the **Disaster Recovery System** slide-in pane.
 - b. In the **Witness Site** section, confirm that the status for the witness site and configured IPSec links is **Up**.
- To view all of the available options for this command, run the **witness reconnect --help** command.

Deregister Your System

After your disaster recovery system has been activated, you may need to update the settings that you entered for a particular site. If you find yourself in this situation, complete the following procedure. Before you proceed, note that the settings that are currently set for all of the sites in your system will be cleared.

Step 1 From the **Action** area, click **Pause** to suspend the operation of your system.

See [Place Your System on Pause, on page 32](#) for more information.


Step 2 From the **Action** area, click **Deregister**.

Cisco DNA Center deletes all of the settings that you configured previously for your system's sites.

Step 3 Complete the tasks described in [Configure Disaster Recovery, on page 14](#) in order to enter the appropriate settings for your sites, reregister them, and reactivate your system.



Monitor the Event Timeline

From the Event Timeline, you can track the progress of disaster recovery tasks that are currently running and confirm when these tasks have completed. To view the timeline, do the following:

1. In the Cisco DNA Center GUI, click the **Menu** icon () and choose **System > Disaster Recovery** to open the **Disaster Recovery** page.

The **Monitoring** tab is selected, by default.

2. Scroll to the bottom of the page.

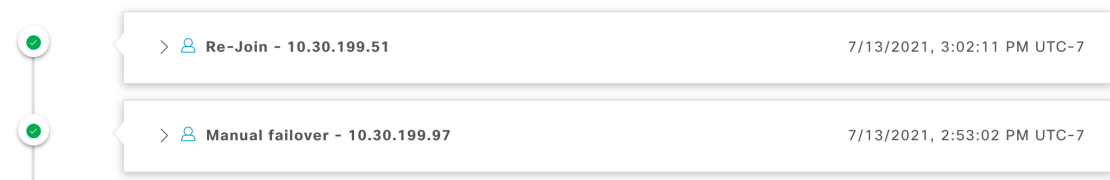
Every task that is in progress or has completed for your system is listed here (in descending order based on their completion timestamp), starting with the most recent task. Cisco DNA Center indicates whether each task was initiated by the system () or a user ()



Event Timeline

[Hide Timeline](#)

End

Last Update: 7/13/2021, 3:11:00 PM UTC-7



Task Name	Timestamp
>  Re-Join - 10.30.199.51	7/13/2021, 3:02:11 PM UTC-7
>  Manual failover - 10.30.199.97	7/13/2021, 2:53:02 PM UTC-7

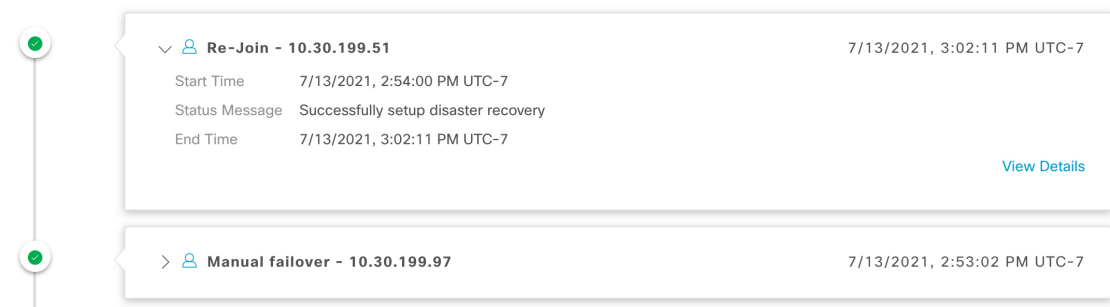
Say you want to monitor the restoration of your system after it was paused. Cisco DNA Center updates the Event Timeline as each task in the restoration process is started and then completed. To view a summary of what took place during a particular task, click >.



Event Timeline

[Hide Timeline](#)

End

Last Update: 7/13/2021, 3:12:07 PM UTC-7



Task Name	Timestamp
>  Re-Join - 10.30.199.51 Start Time 7/13/2021, 2:54:00 PM UTC-7 Status Message Successfully setup disaster recovery End Time 7/13/2021, 3:02:11 PM UTC-7 View Details	7/13/2021, 3:02:11 PM UTC-7
>  Manual failover - 10.30.199.97	7/13/2021, 2:53:02 PM UTC-7

If the **View Details** link is displayed for a task, click it to view a listing of the relevant subtasks that were completed.

Event Timeline

[Hide Timeline](#)

End

Last Update: 7/13/2021, 3:12:07 PM UTC-7

Event Timeline showing a task: **Re-Join - 10.30.199.51** (7/13/2021, 3:02:11 PM UTC-7). The task status is successful (green checkmark). The task details include:

- Start Time: 7/13/2021, 2:54:00 PM UTC-7
- Status Message: Successfully setup disaster recovery
- End Time: 7/13/2021, 3:02:11 PM UTC-7

Subtasks shown:

- Configure active - 10.30.199.51** (7/13/2021, 2:58:10 PM UTC-7)
- Configure standby - 10.30.199.97** (7/13/2021, 3:02:04 PM UTC-7)

Additional task shown below:

- Manual failover - 10.30.199.97** (7/13/2021, 2:53:02 PM UTC-7)

[Hide Details](#)

As with tasks, you can click > to view summary information for a particular subtask.

Event Timeline

[Hide Timeline](#)

End

Last Update: 7/13/2021, 3:12:07 PM UTC-7

Event Timeline showing a task: **Re-Join - 10.30.199.51** (7/13/2021, 3:02:11 PM UTC-7). The task status is successful (green checkmark). The task details include:

- Start Time: 7/13/2021, 2:54:00 PM UTC-7
- Status Message: Successfully setup disaster recovery
- End Time: 7/13/2021, 3:02:11 PM UTC-7

Subtask details for **Configure active - 10.30.199.51** (7/13/2021, 2:58:10 PM UTC-7):

- Start Time: 7/13/2021, 2:54:08 PM UTC-7
- Status Message: Successfully configured active system
- End Time: 7/13/2021, 2:58:10 PM UTC-7

Subtasks shown for 'Configure active':

- Configure standby to active services - 10.30.199.51** (7/13/2021, 2:58:04 PM UTC-7)
- Add other cluster metadata - 10.30.199.51** (7/13/2021, 2:57:18 PM UTC-7)
- File system migration - 10.30.199.51** (7/13/2021, 2:55:29 PM UTC-7)
- Save cluster metadata - 10.30.199.51** (7/13/2021, 2:55:18 PM UTC-7)
- Validate active cluster - 10.30.199.51** (7/13/2021, 2:54:09 PM UTC-7)

[Hide Details](#)

See [Troubleshoot Your Disaster Recovery System, on page 40](#) for a description of the issues you may encounter while monitoring the Event Timeline and how to remedy them.

System and Site States

In the disaster recovery GUI, the **Status** area indicates the current state of your system. The following tables explain the various states you may see for your system's individual sites in the Topology.

Table 1: Active Site States

State	Description
Unregistered	Newly installed site. Disaster recovery information is not available yet.
Initializing	The site is preparing to transmit the data required by the other sites in order to set up the disaster recovery cluster during the registration process.
Initialized	The site has successfully prepared the data it will transmit to the other sites in order to set up the disaster recovery cluster during the registration process.
Failed to Initialize	The site encountered an error while preparing to transmit the data required by the other sites in order to set up the disaster recovery cluster during the registration process.
Connecting Recovery	The main site is contacting the recovery site to retrieve the initialized data required to set up secure communication with the main site.
Connecting Witness	The main site is contacting the witness site to retrieve the initialized data required to set up secure communication with the main site.
Recovery Site Connected	The main site successfully established secure communication with the recovery site.
Failed to Connect Recovery	The main site encountered an error while establishing a secure channel with the recovery site.
Failed to Connect Witness	The main site encountered an error while establishing a secure channel with the witness site.
Registered	The active site successfully established secure communication with the other two sites.
Deregistering	Removing the current disaster recovery configuration from the system.
Deregister Failed	An error occurred while removing the current disaster recovery configuration from the system.
Validating	Validating the state of the system before starting disaster recovery configuration.
Validated	Successfully validated the state of the system before starting disaster recovery configuration.
Validation Failed	An error occurred while validating the state of the system before starting disaster recovery configuration.
Configuring Active	Executing the workflows to establish this site as the active site.
Failed to Configure	An error occurred while running the workflows to enable disaster recovery on this site.
Syncing Config Data	Syncing the data required from the other sites to set up the disaster recovery system.
Config Data Synced	Successfully synced the data required from the other sites to set up the disaster recovery system.

State	Description
Active Sync Failed	An error occurred while the pending active site was syncing the data required from the other sites to set up the disaster recovery system.
Waiting Standby Configuration	Successfully completed the workflows to establish this site as the active site; waiting for the standby site's workflows to complete.
Active	The site is successfully managing the network as the active site.
Failed to Configure	The site failed to execute some of the workflows that would enable itself as the active site in the disaster recovery cluster.
Isolating	The site is executing the workflows to isolate itself because it either lost connectivity with the other two sites or is preparing to become standby-ready (as part of a manual failover).
Isolated	The site has successfully executed the workflows to isolate itself because it either lost connectivity with the other two sites or is preparing to become standby-ready (as part of a manual failover).
Failed to Isolate	The site encountered an error while executing the workflows to isolate itself because it either lost connectivity with the other two sites or is preparing to become standby-ready (as part of a manual failover).
Configuring Active	Configuring a previous standby site as the active site (as part of a system-triggered or manual failover).
Failed during Failover	An error occurred while executing the workflows to establish this site as the active site (as part of a failover or recovery from a two-system failure).
Pausing Active	Executing the workflows that disable disaster recovery operations on the active site (in order to prepare for an administrative operation or a planned outage).
Active Paused	Successfully disabled disaster recovery operations on the active site.
Failed to Pause Active	An error occurred while disabling disaster recovery operations on the active site.
Active Stand Alone	Executing the workflows to establish a previous active site that lost connectivity with the other two sites as an independent system by removing all disaster recovery configurations.
Down	The active site has lost connectivity with the other two sites.

Table 2: Standby Site States

State	Description
Unregistered	Newly installed site. Disaster recovery information is not available yet.
Initializing	The site is preparing to transmit the data required by the other sites in order to set up the disaster recovery cluster during the registration process.
Initialized	The site has successfully prepared the data it will transmit to the other sites in order to set up the disaster recovery cluster during the registration process.

State	Description
Failed to Initialize	The site encountered an error while preparing to transmit the data required by the other sites in order to set up the disaster recovery cluster during the registration process.
Connecting Main	The recovery site is contacting the main site to retrieve the initialized data required to set up secure communication with the main site.
Connecting Witness	The recovery site is contacting the witness site to retrieve the initialized data required to set up secure communication with the main site.
Main Site Connected	The recovery site successfully established secure communication with the main site.
Failed to Connect Main	The recovery site encountered an error while establishing a secure channel with the main site.
Failed to Connect Witness	The recovery site encountered an error while establishing a secure channel with the witness site.
Registered	The standby site successfully established secure communication with the other two sites.
Deregistering	Removing the current disaster recovery configuration from the system.
Deregister Failed	An error occurred while removing the current disaster recovery configuration from the system.
Validating	Validating the state of the system before starting disaster recovery configuration.
Validated	Successfully validated the state of the system before starting disaster recovery configuration.
Validation Failed	An error occurred while validating the state of the system before starting disaster recovery configuration.
Configuring Standby	Executing the workflows to establish this site as the standby site.
Failed to Configure	An error occurred while running the workflows to enable disaster recovery on this site.
Syncing Config Data	Syncing the data required from the other sites to set up the disaster recovery system.
Config Data Synced	Successfully synced the data required from the other sites to set up the disaster recovery system.
Standby Sync Failed	An error occurred while the pending standby site was syncing the data required from the other sites to set up the disaster recovery system.
Waiting Active Configuration	Successfully completed the workflows to establish this site as the standby site; waiting for the active site's workflows to complete.
Standby	The site is successfully configured as the standby site in the disaster recovery cluster.
Failed to Configure	The site failed to execute some of the workflows that would enable itself as the standby site in the disaster recovery cluster.
Isolating	The site is executing the workflows to isolate itself because it lost connectivity with the other two sites.
Isolated	The site has successfully executed the workflows to isolate itself because it lost connectivity with the other two sites.

State	Description
Failed to Isolate	The site encountered an error while executing the workflows to isolate itself because it lost connectivity with the other two sites.
Configuring Standby	Configuring a previous active site as the standby-ready site (as part of a manual failover).
Standby Ready	A previous active system is ready to be configured as a standby system (as a result of a failover).
Pausing Standby	Executing the workflows that disable disaster recovery operations on the standby site (in order to prepare for an administrative operation or a planned outage).
Standby Paused	Successfully disabled disaster recovery operations on the standby site.
Failed to Pause Standby	An error occurred while disabling disaster recovery operations on the standby site.
Standby Stand Alone	Executing the workflows to establish a previous standby site that lost connectivity with the other two sites as an independent system by removing all disaster recovery configurations.
Down	The site has lost connectivity with the other two sites.

Table 3: Witness Site States

State	Description
Unregistered	Newly installed site. Disaster recovery information is not available yet.
Registered	This site has been designated as the witness site and the validation checks have completed successfully.
Up	Configuration of the witness site has completed successfully.
Down	The site has lost connectivity with the other two sites.

Upgrade a Disaster Recovery System

In this scenario, the first Cisco DNA Center version installed on your appliances was an earlier 2.1.x version and now you want to upgrade to 2.2.3. Also, disaster recovery is enabled and operational on these appliances. Complete the following steps to complete the upgrade:

-
- Step 1** [Place Your System on Pause, on page 32.](#)
 - Step 2** Upgrade the appliances at your main and recovery sites to version 2.2.3. In the [Cisco DNA Center Upgrade Guide](#), see the "Upgrade to Cisco DNA Center 2.2.3.0" chapter.
 - Step 3** [Replace the Current Witness Site, on page 21.](#)
 - Step 4** [Rejoin Your System, on page 34.](#)
-

Failovers: An Overview

A failover takes place when your disaster recovery system's standby site takes over the responsibilities of the former active site and becomes the new active site. Cisco DNA Center supports two types of failover:

- **System-triggered:** Occurs when your system's active site experiences an issue that brings it offline (such as a hardware failure or network outage). When Cisco DNA Center recognizes that the active site has not been able to communicate with the rest of the Enterprise network (as well as the standby and witness sites) for seven minutes, it completes the tasks necessary for your standby site to assume its role so that network operations can continue without interruption.
- **Manual:** Occurs when a super-admin user instructs Cisco DNA Center to swap the roles that are currently held by your system's active and standby sites. You would typically do this before you update the Cisco DNA Center software that is installed on a site's appliances or perform routine site maintenance.

After either type of failover has taken place and the former active site has come back online, your disaster recovery system automatically moves the site to the **Standby Ready** state. To establish this site as the new standby site, click **Rejoin** in the **Action** area of the **Monitoring** tab.

Initiate a Manual Failover

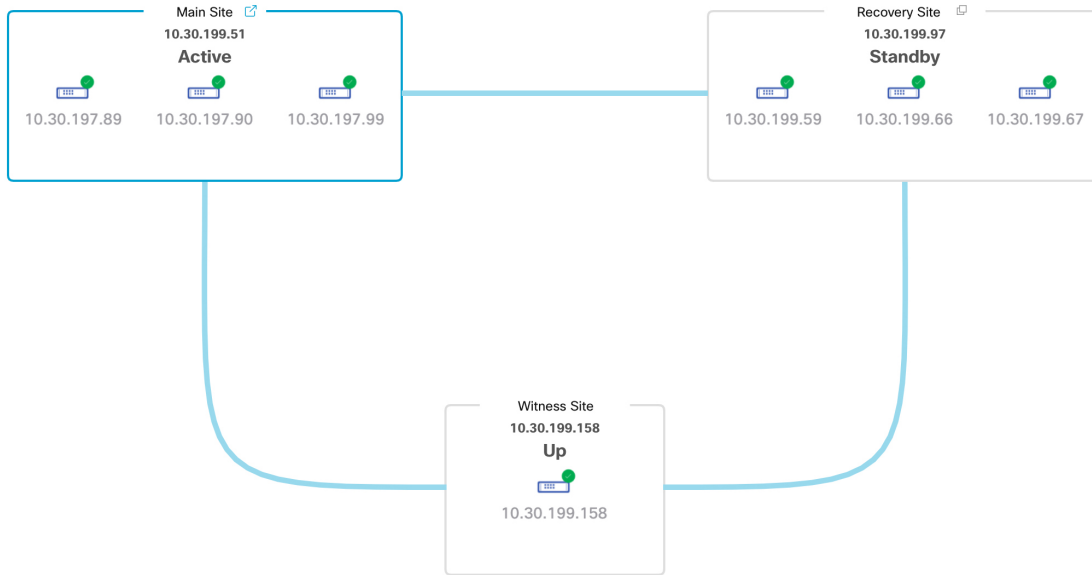
When you manually initiate a failover, you instruct Cisco DNA Center to swap the roles that are currently assigned to your disaster recovery system's main and recovery site. This is handy if you know that the current active site is experiencing issues and you want to proactively designate the standby site as the new active site. Complete the following procedure to initiate a manual failover.



Note You cannot initiate a manual failover from your witness site. You can only do so from the current active site.

Step 1 In the Cisco DNA Center GUI, click the **Menu** icon (☰) and choose **System > Disaster Recovery** to open the **Disaster Recovery** page.

The **Monitoring** tab is selected, by default, and displays your disaster recovery system's topology. In the following example, the user is logged in to the current active site.



Step 2 In the **Action** area, click **Manual Failover**.

The **Disaster Recovery Manual Failover** dialog opens, indicating that the standby site will assume the **Active** role.

Step 3 Click **Continue** to proceed.

A message appears in the bottom right corner of the page, indicating that the failover process has started. The site previously acting as the active site is isolated from the system and enters the **Standby Ready** state.



At this point, the main and recovery sites are not connected and data replication is not taking place. If the former active site is experiencing issues, now is a good time to resolve those issues.

A subsequent failover (initiated by either the system or a user) cannot take place until you add the former active site back to your disaster recovery system.

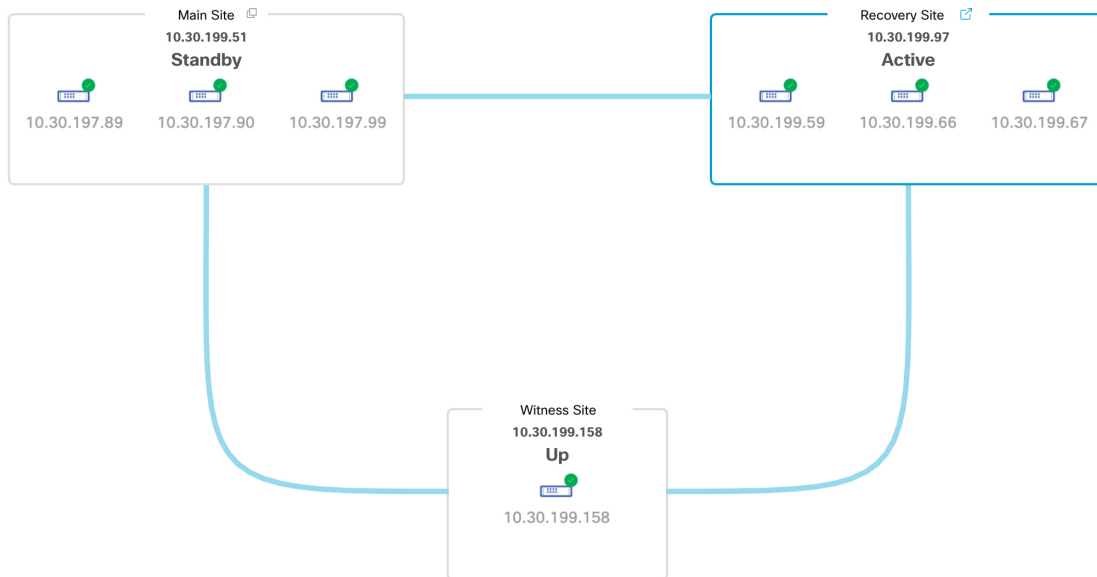
Step 4 Reconnect the main and recovery sites and reconfigure your disaster recovery system:

- a. Log in to your recovery site.
- b. In the **Action** area, click **Rejoin**.

A dialog opens, indicating that data on the standby site will be erased.

Step 5 Click **Continue** to proceed and restart data replication.

After Cisco DNA Center completes the relevant workflows, the manual failover completes. The main site, which was currently serving as the active site, is now the standby site.



Step 6 Confirm that your disaster recovery system is operational again:

- a. In the top right corner of the **Monitoring** tab, verify that its status is listed as **Up and Running**.
- b. In the Event Timeline, verify that the **Rejoin** task completed successfully.

Event Timeline

[Hide Timeline](#)

End

Last Update: 7/13/2021, 1:52:15 PM UTC-7

The event timeline displays three successful operations on a vertical timeline with green circular markers. Each event is shown in a white box with a dropdown arrow and a user icon.

Event Name	Start Time	Status Message	End Time	Action
Re-Join - 10.30.199.97	7/13/2021, 1:41:08 PM UTC-7	Successfully setup disaster recovery	7/13/2021, 1:51:02 PM UTC-7	Hide Details
Configure active - 10.30.199.97	7/13/2021, 1:41:14 PM UTC-7	Successfully configured active system	7/13/2021, 1:45:17 PM UTC-7	View Details
Configure standby - 10.30.199.51	7/13/2021, 1:41:16 PM UTC-7	Successfully configured standby system	7/13/2021, 1:50:55 PM UTC-7	View Details

Pause Your Disaster Recovery System

By pausing your main and recovery sites, you are effectively breaking up your disaster recovery system. The sites will no longer be connected and instead will act as standalone clusters. You would want to pause your system to temporarily disable the replication of data from the active site to the standby site if you plan to break up your system for an extended period of time. You would also pause the disaster recovery system to do one of the following:

- Complete any administrative tasks, such as upgrade the clusters or install additional packages
- Replace the system or disaster recovery certificate
- Perform maintenance on the main, recovery, or witness site clusters
- Prepare for a planned network or power outage

Place Your System on Pause

To temporarily pause your disaster recovery system, which you would typically do before performing maintenance on a system component, complete the following procedure:

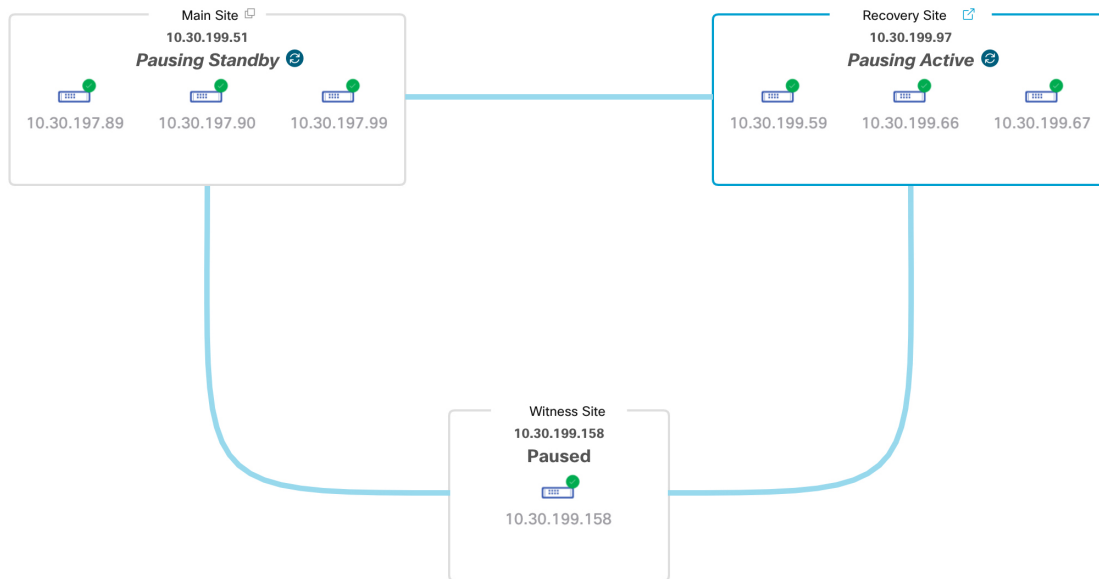
- Step 1** In the Cisco DNA Center GUI, click the **Menu** icon (☰) and choose **System > Disaster Recovery** to open the **Disaster Recovery** page.

The **Monitoring** tab is selected, by default, and displays your disaster recovery system's topology.

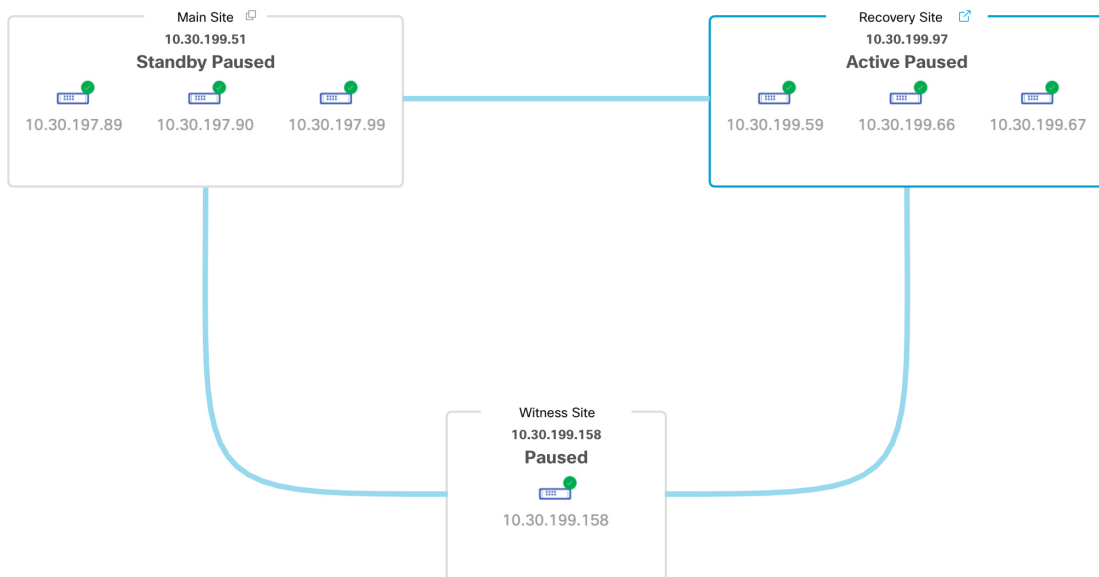
Step 2 In the **Action** area, click **Pause**.

Step 3 In the resulting dialog, click **Continue** to proceed.

A message appears in the bottom right corner of the page, indicating that the process to pause your system has started. To pause your system, Cisco DNA Center disables data and service replication. It also reinstates the services that were suspended on your recovery site. As this is taking place, the status for your main and recovery sites is set to **Pausing** in the topology.



After Cisco DNA Center completes the necessary tasks, the topology updates and sets the status for your main, recovery, and witness sites as **Paused**.



Step 4 Confirm that your disaster recovery system has been paused:

- a. In the top right corner of the **Monitoring** tab, verify that its status is listed as **Paused**.
- b. In the Event Timeline, verify that the **Pause Disaster Recovery System** task completed successfully.

Event Timeline

[Hide Timeline](#)

End

Last Update: 7/13/2021, 2:14:54 PM UTC-7

Event Timeline showing the successful completion of the **Pause Disaster Recovery System** task.

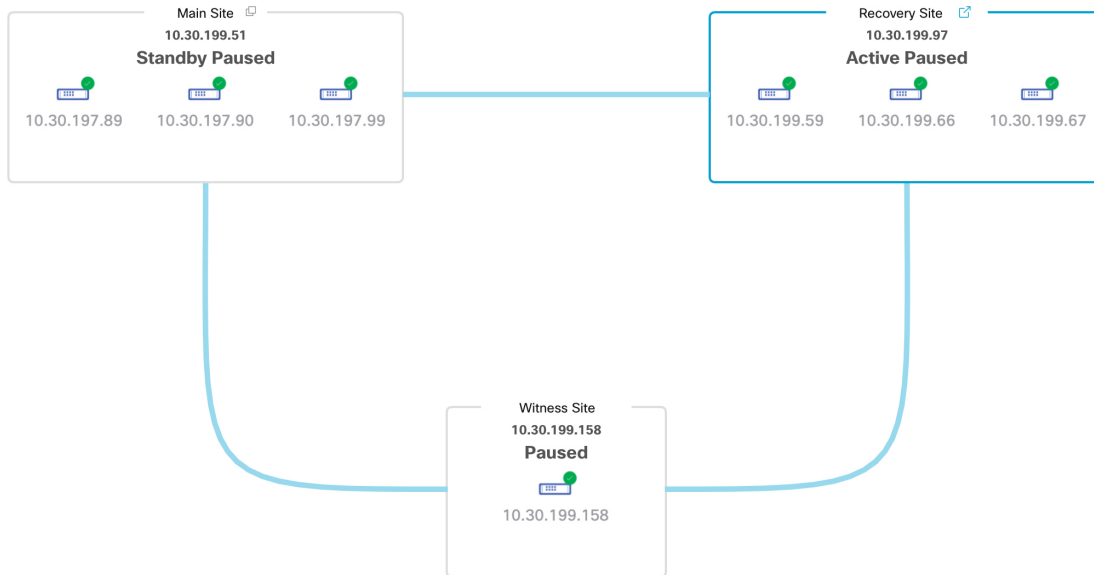
- Pause Disaster Recovery System - 10.30.199.97** (7/13/2021, 2:13:46 PM UTC-7)
 - Start Time: 7/13/2021, 2:00:24 PM UTC-7
 - Status Message: Successfully prepared clusters for pause Disaster Recovery System.
 - End Time: 7/13/2021, 2:13:46 PM UTC-7
 - [Hide Details](#)
- Active cluster standalone - 10.30.199.97** (7/13/2021, 2:01:33 PM UTC-7)
 - Start Time: 7/13/2021, 2:00:31 PM UTC-7
 - Status Message: Successfully prepared active cluster for pause Disaster Recovery System.
 - End Time: 7/13/2021, 2:01:33 PM UTC-7
 - [View Details](#)
- Standby cluster standalone - 10.30.199.51** (7/13/2021, 2:13:38 PM UTC-7)
 - Start Time: 7/13/2021, 2:00:27 PM UTC-7
 - Status Message: Successfully prepared standby cluster for pause Disaster Recovery System.
 - End Time: 7/13/2021, 2:13:38 PM UTC-7
 - [View Details](#)

Rejoin Your System

Complete the following procedure in order to restart a disaster recovery system that is currently on pause.

Step 1 In the Cisco DNA Center GUI, click the **Menu** icon (☰) and choose **System > Disaster Recovery** to open the **Disaster Recovery** page.

The **Monitoring** tab is selected, by default, and displays your disaster recovery system's topology.



Step 2 In the **Action** area, click **Rejoin**.

A dialog opens, indicating that all of the data on your standby site will be erased.

Step 3 Click **Continue** to proceed.

A message appears in the bottom right corner of the page, indicating that the process to reconnect your main, recovery, and witness sites has started. As this is taking place, the status for your main and recovery sites is set to **Configuring** in the topology.



After Cisco DNA Center completes the necessary tasks, the topology updates the status for your main, recovery, and witness sites.



Step 4 Confirm that your disaster recovery system is operational again by verifying that its status is listed as **Up and Running** in the top right corner of the **Monitoring** tab.

Disaster Recovery System Considerations

This section describes things to be aware of when managing your disaster recovery system.

Backup and Restore Considerations

Keep the following points in mind when backing up and restoring your disaster recovery system:

- A backup can only be scheduled from your system's active site.
- You cannot restore a backup file when disaster recovery is enabled. You must first pause your system temporarily. See [Place Your System on Pause, on page 32](#) for more information.
- You should only restore a backup file on the site that was the active site prior to pausing your system. After you restore the backup file, you then need to rejoin your system's sites. Doing so will reinstate disaster recovery and initiate the replication of the active site's data to the standby site. See [Rejoin Your System, on page 34](#) for more information.
- You can only restore a backup file on cluster nodes that have the same Cisco DNA Center version installed as the other nodes in your system.
- After a failover takes place, your deployment's backup and restore settings and schedule are not replicated to the new active site. You will need to configure them again.
- If applicable to your deployment, we recommend that you upgrade the TLS version for incoming TLS connections to Cisco DNA Center. In the [Cisco DNA Center Security Best Practices Guide](#), see the "Change the Minimum TLS Version and Enable RC4-SHA (Not Secure)" topic.

For more information on backing up and restoring your disaster recovery system, see [Backup and Restore](#).

Node or Cluster Replacement Considerations

You cannot do either of the following without breaking your disaster recovery system's configuration:

- Replace one of the nodes in a 1+1+1 setup.
- Replace all of one site's nodes in a 3+3+1 setup.

If you need to do so, ensure that you then complete the steps described in [Deregister Your System, on page 22](#) to get your system up and running again.

Reconfiguration Considerations

- Any data present on the appliances that reside at the recovery site will be deleted in the following scenarios:
 - When setting up your disaster recovery system for the first time and you activate the system.
 - When the recovery site is the current active site, you pause your system, deregister it, and then reregister it as the recovery site.
- When you reconfigure an existing disaster recovery system, make sure you know which site is the current active site and register it as your system's main site. Alternatively, you can make a backup of the recovery site's data (if it's currently active) and restore this data on your system's main site prior to the system's reconfiguration.
- The following changes cannot be made without reconfiguring your system:
 - Changing the IP addresses and static/default routes configured for your disaster recovery system's Enterprise and Management interfaces.
 - Updating a site's **cluster_hostname** setting.

Complete the steps described in [Deregister Your System, on page 22](#) to configure new IP addresses and routes. If you updated the **cluster_hostname** value, complete these same steps after doing so.

HA Considerations

You cannot convert the main and recovery sites from single-node clusters to HA clusters without breaking your disaster recovery system's configuration. If you need to do so, do the following:

1. [Deregister Your System, on page 22](#).
2. Convert both sites to HA clusters.
3. Reregister and reactivate disaster recovery (see [Configure Disaster Recovery, on page 14](#)).

Site Failure Considerations

By default, the disaster recovery system waits seven minutes before recognizing that a site has failed and taking one of the following actions:

- When the active site goes down, it starts the failover process.
- When either the standby or witness site goes down, the system marks that site as down and disables the ability to start any tasks from the **Action** area.

If you try to initiate a task before the seven minutes have passed, the **Details** area will display a message that indicates why it cannot be completed.

Certificate Replacement Considerations


If you want your disaster recovery system to use a different certificate or need to replace an expired certificate, do the following:

1. [Place Your System on Pause](#).
2. Replace your system's certificate by completing the steps described in the [Add the Disaster Recovery Certificate, on page 10](#) topic.

Disaster Recovery Event Notifications

You can configure Cisco DNA Center to send a notification whenever a disaster recovery event takes place. See the "Work with Events" topic in the [Cisco DNA Center Platform User Guide](#) for a description of how to configure and subscribe to these notifications. When completing this procedure, ensure that you select and subscribe to the SYSTEM-DISASTER-RECOVERY event in the **Platform > Developer Toolkit > Events** table.

After you subscribe, Cisco DNA Center sends a notification indicating that the IPsec session is down because the system's certificate has expired. Do the following to update this certificate:

1. [Place Your System on Pause, on page 32](#).
2. On both your main and recovery site, replace the current system certificate. In the Cisco DNA Center GUI, click the **Menu** icon () and choose **System > Settings > Trust & Privacy > Certificates > System**.
3. [Rejoin Your System, on page 34](#).

Supported Events

The following table lists the disaster recovery events that Cisco DNA Center generates notifications for when they take place.

System Health Status	Event	Notification
OK	The disaster recovery system is operational.	Activate DR (Disaster Recovery Setup Successful)
OK	Failover to either the main or recovery site has completed successfully.	Failover Successful

System Health Status	Event	Notification
OK	Registration of the main site has completed successfully.	Successfully Registered Main Site
OK	Registration of the recovery site has completed successfully.	Successfully Registered Recovery Site
OK	Registration of the witness site has completed successfully.	Successfully Registered Witness Site
OK	The disaster recovery system has been paused successfully.	DR Pause Success
OK	The standby site is operational.	Standby Site Up
OK	The witness site is operational.	Witness Site Up
OK	The disaster recovery system has been unregistered successfully.	Unregister Success
Degraded	Failover to either the main or recovery site has failed.	Failover Failed
Degraded	Automated failover is not available because the standby site is currently down.	Standby Cluster Down
Degraded	Automated failover is not available because the witness site is currently down.	Witness Cluster Down
Degraded	Unable to place the disaster recovery system on pause.	Pause Failure
Degraded	BGP route advertisement failed.	BGP Failure
Degraded	The IPsec tunnel connecting your system's sites is operational.	IPsec Up
Degraded	The IPsec tunnel connecting your system's sites is currently down.	IPsec Down
NotOk	Disaster recovery system configuration failed.	Activate DR Failure
NotOk	The site that is currently in the Standby Ready state is unable to rejoin the disaster recovery system.	Activate DR Failure
NotOk	Unregistration of the disaster recovery system failed.	Unregistration Failed
NotOk	Registration of the main site failed.	Main Registration Failed
NotOk	Registration of the recovery site failed.	Recovery Registration Failed
NotOk	Registration of the witness site failed.	Witness Registration Failed

Troubleshoot Your Disaster Recovery System

The following table describes the issues that your disaster recovery system may present and how to deal with them.



Note If a disaster recovery operation fails or times out, click **Retry** to perform the operation again. If the problem persists and its solution is not provided in the following table, contact Cisco TAC for assistance.

Table 4: Disaster Recovery System Issues


Error Code	Message	Solution
SODR10007	Token does not match.	The token provided during recovery site registration does not match the token generated during main site registration. From the main site's Disaster Recovery > Configuration tab, click Copy Token to ensure that you copy the correct token.
SODR10048	Packages (<i>package names</i>) are mandatory and not installed on the main site.	Install the listed packages before registering the system.
SODR10056	Invalid credentials.	Confirm that you entered the correct credentials for the main site during recovery and witness site registration.
SODR10062	() site is trying to () with invalid IP address. Expected is (); actual is ().	The main site IP address provided during recovery and witness site registration is different from the IP address that was provided during main site registration.
SODR10067	Unable to connect to (<i>recovery or witness site</i>).	Verify that the main site is up.
SODR10072	All the nodes are not up for (<i>main or recovery site</i>).	Check whether all three of the site's nodes are up.

Error Code	Message	Solution
SODR10076	High availability should be enabled on <i>(main or recovery)</i> site cluster.	Enable high availability (HA): <ol style="list-style-type: none"> 1. Log in to the site you need to enable HA on. 2. In the Cisco DNA Center GUI, click the Menu icon (☰) and choose System > Settings > System Configuration > High Availability. 3. Click Activate High Availability.
SODR10100	<i>(Main or recovery)</i> site has no third party certificate.	Replace the default certificate that Cisco DNA Center is currently using with a third-party certificate. See Update the Cisco DNA Center Server Certificate for more information.
SODR10118	Appliance mismatch between main () and recovery ().	Different appliances are used by the main and recovery sites. To successfully register disaster recovery, both sites must use the same 56 or 112 core appliance.
SODR10121	Failed to advertise BGP. Reason: ().	See Troubleshoot BGP Route Advertisement Issues, on page 46 for more information.
SODR10122	Failed to stop BGP advertisement. Reason: ().	See Troubleshoot BGP Route Advertisement Issues, on page 46 for more information.
SODR10123	Failed to establish secure connection between main () and () ().	No solution is available for this issue. Please contact Cisco TAC for assistance.
SODR10124	Cannot ping VIP: <i>(main, recovery, or witness site's VIP or IP address)</i> .	Do the following: <ul style="list-style-type: none"> • Verify that the address specified is correct. • Check whether the address is reachable from the other addresses.
SODR10129	Unable to reach main site. ()	Check whether the Enterprise virtual IP address configured for the main site is reachable from the recovery and witness sites.

Error Code	Message	Solution
SODR10132	Unable to check IP addresses are on the same interface. Retry the operation. ()	Retry the operation you just attempted.
SODR10133	The disaster recovery enterprise VIP () and the IP addresses () are not configured or reachable via the same interface. Check the gateway or static routes configuration.	<p>Communication between a disaster recovery system's sites relies on the Enterprise network. The main and recovery site's Enterprise virtual IP address, as well as the witness site's IP address, need to be reachable via the Enterprise interface.</p> <p>This error indicates that the IP address/virtual IP address configured for one or multiple sites uses an interface other than the Enterprise interface for communication.</p>
SODR10134	The disaster recovery management VIP (VIP address) and the IPs (IP addresses) are configured/reachable via same interface. It should be configured/reachable via management interface. Check the gateway or static routes' configuration.	<p>The disaster recovery system's Management virtual IP address needs to be configured on the Management interface. This error indicates that the virtual IP address is currently configured on an interface where the Management cluster's virtual IP address has not been configured.</p> <p>Add a /32 static route to the Management virtual IP address that's configured on the Management interface.</p>
SODR10136	Certificates required to establish IPsec session not found.	From the System Certificate page (System > Settings > Trust & Privacy > Certificates > System), try uploading the third-party certificate again and then retry registration. If the problem persists, contact Cisco TAC for assistance.
SODR10138	Self-signed certificate is not allowed. Upload a third-party certificate and retry.	—

Error Code	Message	Solution
SODR10139	Disaster recovery requires first non-wildcard DNS name to be same in main and recovery. {} in {} site certificate is not same as {} in {} site certificate.	<p>The third-party certificate installed on your main and recovery sites has different DNS names specified for your disaster recovery system. Generate a third-party certificate that specifies a DNS name for your system and upload this certificate to both sites.</p> <p>Note Ensure that the DNS name does <i>not</i> use a wildcard.</p>
SODR10140	Disaster recovery requires at least one non-wildcard DNS name. No DNS name found in certificate.	<p>The third-party certificate installed on your main and recovery sites does not specify a DNS name for your disaster recovery system. Cisco DNA Center uses this name to configure the IPsec tunnel that connects your system's sites. Generate a third-party certificate that specifies a DNS name for your system and upload this certificate to both sites.</p> <p>Note Ensure that the DNS name does <i>not</i> use a wildcard.</p>
—	—	<p>When all three of your system's sites are not connected due to network partitioning or another condition, Cisco DNA Center sets the status of the sites to Isolated. Contact Cisco TAC for help with completing the appropriate recovery procedure.</p>

Error Code	Message	Solution
—	External postgres services does not exists to check service endpoints.	<p>Do the following:</p> <ol style="list-style-type: none"> 1. Log in to the site that the error occurred on. 2. Run the following commands: <ul style="list-style-type: none"> • Kubectl get sep -A • kubectl get svc -A grep external 3. In the resulting output, search for <code>external-postgres</code>. 4. If present, run the following command: kubectl delete sep external-postgres -n fusion 5. Retry the operation that failed previously.
—	Success with errors.	If you see this message after initiating a failover or pausing your disaster recovery system, it indicates that the operation completed successfully even though one or multiple services encountered minor errors. You can go ahead and click Rejoin to restart your system. These errors will be resolved after you do so.
—	Failed.	This message indicates that a disaster recovery operation failed because one or multiple services encountered a critical error. To troubleshoot the failure, we recommend that you view the Event Timeline and drill down to the relevant error. When you see this message, click Retry to perform the operation again.
—	Cannot ping VIP: (VIP address) .	Verify that the Enterprise VIP address configured for your system is reachable.
—	VIP drop-down list is empty.	Confirm that your system's VIP addresses and intracluster link are configured properly.

Error Code	Message	Solution
—	Cannot perform (<i>disaster recovery operation</i>) due to ongoing workflow: BACKUP. Please try again at a later time.	A disaster recovery operation was triggered while a scheduled backup was running. Retry the operation after the backup finishes.
—	The GUI indicates that the standby site is still down after it has come back online.	<p>If the standby site goes down and Cisco DNA Center's first attempt to isolate it from your disaster recovery system fails, it may not automatically initiate a second attempt. When this happens, the GUI will indicate that the site is down, even if it is operational again. In addition, you will not be able to restart your system as the standby site is stuck in maintenance mode.</p> <p>To restore the standby site, do the following:</p> <ol style="list-style-type: none"> 1. In an SSH client, log in to the standby site. 2. Run the maglev maintenance disable command to take the site out of maintenance mode. 3. Log in to Cisco DNA Center. 4. In the GUI, click the Menu icon () and choose System > Disaster Recovery. The Monitoring tab is selected, by default. 5. In the Action area, click Rejoin in order to restart your disaster recovery system.
—	Multiple services exists for MongoDB to check node-port label.	<p>For debugging, the MongoDB node port is exposed as a service. Run the following commands to identify this port and hide it:</p> <ul style="list-style-type: none"> • kubectl get svc --all-namespaces grep mongodb • magctl service unexpose mongodb <port-number>

Error Code	Message	Solution
—	Multiple services exist for Postgres to check node-port label.	<p>For debugging, the Postgres node port is exposed as a service. Run the following commands to identify this port and hide it:</p> <ul style="list-style-type: none"> • <code>kubecttl get svc --all-namespaces grep postgres</code> • <code>magctl service unexpose postgres <port-number></code>

Troubleshoot BGP Route Advertisement Issues

If you receive a BGP route advertisement error, complete the following procedure in order to troubleshoot the cause.

Step 1

From the Cisco DNA Center cluster, validate the BGP session's status:

- In the Event Timeline, confirm whether the **Starting BGP advertisement** task completed successfully (**Activate Disaster Recovery System > View Details > Configure active > View Details**).

If the task failed, do the following before proceeding to Step 1b:

- Check whether the neighbor router indicated in the error message is up.
- Confirm whether the neighbor router has connectivity with Cisco DNA Center. If it doesn't, restore connectivity and then retry activating the new disaster recovery system or restarting an existing system that was paused.

- In the Cisco DNA Center GUI, view the disaster recovery system's Logical Topology and determine whether the neighbor router is currently active.

If it's down, check whether the Cisco DNA Center cluster is configured as a BGP neighbor from the router's perspective. If it's not, configure the cluster as a neighbor and then retry activating the new disaster recovery system or restarting an existing system that was paused.

- Check the status of the BGP session between Cisco DNA Center and its neighbor router by running the following command:

```
etcdctl get /maglev/config/network_advertisement/bgp/address1_address2 | jq
```

where:

- *address1* is the Cisco DNA Center cluster's virtual IP address.
- *address2* is the neighbor router's IP address.

If **Established** is listed in the **state** field, this indicates that the session is active and functioning properly.

- Run the following commands to view the bgpd and bgpmanager log files:

- `sudo vim /var/log/quagga/bgpd.log`

- **magctl service logs -rf bgpmanager | lql**

When viewing the log files, look for error messages. If you can't find any, this indicates that the BGP session is functioning properly.

- e) Check the status of the BGP session between Cisco DNA Center and its neighbor router by running the following command: **echo admin-password| sudo VTYSH_PAGER=more -S -i vtysh -c 'show ip bgp summary'**

In the command output, look for the neighbor router's IP address. At the end of the same line, confirm that the router's connection state is listed as **0**. If this is the case, this indicates that the BGP session is active and functioning properly.

Step 2

From the neighbor router indicated in the error message, validate the BGP session's status:

- a) Run the **show ip bgp summary** command.
- b) In the command output, look for the Cisco DNA Center cluster's virtual IP address. At the end of the same line, confirm that the cluster's connection state is listed as **0**. If this is the case, this indicates that the BGP session is active and functioning properly.
- c) Run the **show ip route** command.
- d) View the command's output and confirm whether the disaster recovery system's Enterprise virtual IP address is being advertised.

For example, say your system's Enterprise virtual IP address is 10.30.50.101. If this is the first IP address that you see in the output, this confirms that it is being advertised.
