Switch Stacks
Cisco Meraki switches allow you to configure anything from a single port to thousands of ports through our cloud-managed Dashboard. In addition, Meraki switches now allow for physical stacking on select switch models. So you can easily manage all of your switches and get physical redundancy in the deployments that need it.

Determining How to Stack

Stacking to Fit your Network
Meraki Switches have multiple options to best fit your network deployment. This article discusses the MS stacking features that can be leveraged to best suit your deployment, specifically: Virtual Stacking, Physical Stacking, and Flexible Stacking.

Understanding Virtual Stacking
With the MS product it’s very easy to manage and deploy hundreds of ports on a network. This is made possible via the use of Virtual Stacking, which is the ability to easily push configuration to hundreds of ports in the network regardless of where the switches are physically located.

By entering a simple filter, a network administrator can easily modify the required ports in just a few clicks.
Understanding Physical Stacking

Physical Stacking helps provide easy management and physical redundancy. Utilizing two physical stacking ports on the back of each switch, a stack can provide for gateway redundancy at layer 3 and dual-homing redundancy at layer 2. Only a single uplink is required to provide connectivity to the stack once all stacking cables are installed.

A step-by-step guide for configuring a physical switch stack can be found in the section of this article, Configuring a Physical Switch Stack.

Understanding Flexible Stacking

Availability and redundancy are most helpful at the distribution layer of a network. On MS420 and MS425 series switches, any two ports can be configured as stack ports. This allows for full redundancy setup for your gateway and minimizes the impact of a failure in the network.

To achieve flexible stacking, select two ports on each switch and enable the stacking option:
A step-by-step guide for configuring a flexible switch stack can be found in the section of this article, Configuring a Flexible Switch Stack.

### Stacking Availability

Unless specifically noted, only like-models, regardless of port density, can be stacked. For example, MS350-48 and MS350-24X can be stacked, but MS250-48 cannot be stacked with an MS350-48.

<table>
<thead>
<tr>
<th>Model</th>
<th>Virtual Stacking</th>
<th>Physical Stacking</th>
<th>Flexible Stacking</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS120</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS210</td>
<td>-</td>
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<td></td>
</tr>
<tr>
<td>MS220</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS225</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS250</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS320</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS350</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS355</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS390</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS410</td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Compatible w/ MS225

Compatible w/ MS210
For switches that support Physical/Flexible Stacking:

<table>
<thead>
<tr>
<th>Stacking Cable Data Rate</th>
<th>Compatible Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 Gigabit</td>
<td>MS210, MS225, MS250, MS350, MS410, MS425</td>
</tr>
<tr>
<td>100 Gigabit</td>
<td>MS355, MS450</td>
</tr>
<tr>
<td>120 Gigabit</td>
<td>MS390</td>
</tr>
</tbody>
</table>

For full information about stacking cable compatibility, available options, and product IDs, see the Stacking Cables section of the SFP and Stacking Accessories datasheet.

**Configuring a Physical Switch Stack**

Up to eight Meraki MS switches can be configured in a physical stack to allow for high-speed communication between devices.

Only like-models can be stacked. For example, MS350-48 and MS350-24X can be stacked, but MS250-48 cannot be stacked with a MS350-48. The MS210 and MS225 series are also cross-compatible with physical stacking.

Physical stacking is available on MS210, MS225, MS250, MS350, MS355, MS390 and MS410 switches, which include dedicated stacking ports. This section describes physical stacking.

Flexible stacking is available on MS420 and MS425 switches which do not have dedicated stacking ports; any port on these switches can be configured as a stack port. For flexible stacking, check the Configuring a Flexible Switch Stack section of this article.

**Configuring a Physical Switch Stack Video**

Media, iframe, embed and object tags are not supported inside of a PDF.

**Physical Switch Stack Configuration Steps**

The steps below explain how to prepare a group of switches for physical stacking, how to stack them together, and how to configure the stack in Dashboard.
1. **Add the switches into a Dashboard network.** This can be a new Dashboard network for these switches, or an existing network with other switches. **Do not configure the stack in Dashboard yet.**

2. Connect each switch with individual uplinks to bring them both online and ensure they can check in with the Meraki Dashboard.

3. Download the latest firmware build using the Firmware Upgrade Manager under **Organization > Monitor > Firmware Upgrades**, if they are not already set for this. This helps ensure each switch is running the same firmware build.

4. With all switches powered off and links disconnected, connect the switches together via stacking cables in a ring topology (as shown in the following image). To create a full ring, start by connecting switch 1/stack port 1 to switch 2/stack port 2, then switch 2/stack port 1 to switch 3/stack port 2 and so forth, with the bottom switch connecting to the top switch to complete the ring.

5. Connect **one** uplink for the entire switch stack.

6. Power on all the switches, then waits several minutes for them to download the latest firmware and updates from Dashboard. The switches may reboot during this process.
   - The power LEDs on the front of each switch will blink during this process.
   - Once the switches are done downloading and installing the firmware, their power LEDs will stay solid white or green.

7. Navigate to **Switch > Monitor > Switch stacks**.

8. Configure the switch stack in Dashboard. If Dashboard has already detected the correct stack under **Detected potential stacks**, click **Provision this stack** to automatically configure the stack. Otherwise, to configure the stack manually:
   - Navigate to **Switch > Monitor > Switch stacks**.
   - Click **add one / Add a stack**.
Select the checkboxes of the switches you would like to stack, name the stack, and then click Create.

9. The configuration is complete and the stack should be up and running.

**NOTE:** After the switch stack is up and running, multiple uplinks can be added for redundancy.

### Stacking MS390s

1. Add the switches into a Dashboard network. This can be a new Dashboard network for these switches, or an existing network with other switches. Do not configure the stack in Dashboard yet.

2. Connect each switch with individual uplinks to bring them both online and ensure they can check in with the Meraki Dashboard.

3. Download the same firmware build (that includes support for MS390) using the Firmware Upgrade Manager under Organization > Monitor > Firmware Upgrades, if they are not already set for this. This helps ensure each switch is running the same firmware build. Please note that it might take close to an hour for the switches to upgrade.

4. Navigate to Switch > Monitor > Switch stacks

5. Configure the switch stack in Dashboard.

   - Click add one:

   **Switch stacks overview**
   
   **Configured stacks**
   
   There are no configured stacks in this network. If you add one, we can help you configure it.
Select the checkboxes of the switches you would like to stack, name the stack, and then click **Create**.

6. Ensure that all switches have downloaded the latest configuration. To verify this, navigate to **Switch > Switches** and select the MS390 switch. Look for ‘CONFIG’ in the column on the left of the switch details page and check if the status reads ‘**Up to date**’.

7. Power off the switches and disconnect all uplinks.

8. With all switches powered off and links disconnected, connect the switches together via stacking cables in a ring topology (as shown in the following image). To create a full ring, start by connecting switch 1/stack port 1 to switch 2/stack port 2, then switch 2/stack port 1 to switch 3/stack port 2 and so forth, with the bottom switch connecting to the top switch to complete the ring.
8. Connect **one** uplink for the entire switch stack.
9. Power on all the switches.

**Adding a new member to the stack**

1. **Add the new switch into a Dashboard network** of the existing MS390 stack.
2. Connect the new switch to an uplink to bring it online and ensure it checks in with the Meraki Dashboard.
3. Upgrade the switch to the same firmware build as that running on the switch stack, using the Firmware Upgrade Manager under **Organization > Monitor > Firmware Upgrades**.

4. Before adding the new member to an existing stack make sure the total number of VLANs is limited to 1000. E.g if you have an existing stack with each port set to Native VLAN 1, 1-1000 and the new member ports are set to native VLAN 1; allowed VLANs: 1,2001-2500 then your total number of VLAN in the stack will be 1000(1-1000)+500(2001-2500) = 1500. Dashboard will not allow the new member to be added to the stack and will show the following error:

![Error message showing VLAN limit exceeded]

5. Navigate to **Switch > Switch stacks** and select the existing stack you want to add the switch to.

6. Check that the switches in the existing stack have all fetched the new configuration. To verify this, navigate to **Switch > Switches** and select an MS390 switch in the stack. Look for ‘CONFIG’ in the column on the left of the switch details page and check if the status reads ‘Up to date’.

7. Under “Manage members” tab add the new switch to the existing stack.

8. Power off the switch and physically stack the new switch to the existing stack in a ring fashion.

9. Power on the new member.

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**Configuring a Flexible Switch Stack**

Up to eight Meraki MS420/425 switches can be configured in a flexible stack to allow for high-speed communication between devices.

- **Flexible stacking** is available on MS420 and MS425 switches, which do not have dedicated stacking ports; any SFP+ interface on these switches can be configured as a stack port. This article describes **flexible stacking**.

  Only like-models can be stacked. For example, MS350-48 and MS350-24X can be stacked, but MS250-48 cannot be stacked with a MS350-48.

  Physical stacking is available on MS225, MS250, MS350, and MS410 switches, which include dedicated stacking ports. For **physical stacking**, check the Configuring a Physical Switch Stack section of this article.

On the MS420 and MS425 series switches you have the flexibility to use any of the front ports as either ethernet (default) or stacking. This option is available under the port configuration and can be easily modified by just selecting enable from the dropdown.
Once this configuration is made and the switches have downloaded the new configuration it’s recommended to follow a similar ring topology as mentioned above for the overall port cabling. Ports configured as stack ports will show up with a new symbol on the nodes status page to indicate that it’s configured for stacking.

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**Configuring a Flexible Switch Stack Video**

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**Flexible Switch Stack Configuration Steps**

The following steps explain how to prepare a group of switches for flexible stacking, how to stack them together, and how to configure the stack in Dashboard:

1. **Add the switches into a Dashboard network.** This can be a new Dashboard network for these switches, or an existing network with other switches. **Do not configure the stack in Dashboard yet.**

2. Connect an uplink to each switch. Ensure that the uplink ports are different than the intended stacking ports.

3. Power on all the switches, then wait several minutes for them to download the latest firmware and updates from Dashboard. The switches may reboot during this process.
   - The power LEDs on the front of each switch will blink during this process.
   - Once the switches are done downloading and installing firmware, their power LEDs will stay solid white or green.

4. **Choose** (but do not yet connect) two ports per switch to be the dedicated stacking ports. Switch stacks should be connected in a ring topology (as shown in the following image). Ensure that the stacking ports are different than the switch uplink port. Do not actually connect the ports yet. This will be done in Step 6.
5. Configure the intended ports for stacking in Dashboard under **Switch > Configure > Switch ports**:

- **Enabled:**
- **Stacking:**
- **RSTP:**

6. Connect the switch stack via the intended stacking ports like the image shown in step 4.

7. Navigate to **Switch > Monitor > Switch stacks**.

8. Configure the switch stack in Dashboard. If Dashboard has already detected the correct stack under **Detected potential stacks**, click **Provision this stack** to automatically configure the stack. Otherwise, to configure the stack manually:
   - Navigate to **Switch > Monitor > Switch stacks**.
   - Click **add one / Add a stack**:

**Switch stacks overview**

**Configured stacks**

There are no configured stacks in this network. If you **add one**, we can help you configure it.

**Detected potential stacks**

<table>
<thead>
<tr>
<th>Stack Members</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch 3</td>
<td>Provision this stack</td>
</tr>
<tr>
<td>Switch 8</td>
<td></td>
</tr>
</tbody>
</table>

   - Select the checkboxes of the switches you would like to stack, name the stack, and then click **Create**.
9. Disconnect all but one switch’s uplink, which will be the uplink for the switch stack.

Viewing and Creating your Stacks

The Switch Stacks Page gives you quick access to all of the configured stacks in the network as well as provides easy configuration options for new Stacks that are being deployed. Clicking on "Add a stack" or when there is a detected stack you’ll be able to easily configure a new physical stack.

Check the Health of the Stack
**Viewing a Stack**

In order to check the stack status visually simply click any row on the Stacks List. This will take you to the Overview of the stack selected. From here you can easily get a feel for connected ports and which switches are contained in the stack. We've included the capability to blink the LEDs on switches in the stack to easily indicate which switch it is for anyone who's on site looking at the stack.

<table>
<thead>
<tr>
<th>Member</th>
<th>Blink LEDs</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDF 5.2.12</td>
<td><img src="image1" alt="Blink LEDs" /></td>
<td>MS350-48FP-HW</td>
</tr>
<tr>
<td>IDF 5.2.13</td>
<td><img src="image2" alt="Blink LEDs" /></td>
<td>MS350-48FP-HW</td>
</tr>
<tr>
<td>IDF 5.2.14</td>
<td><img src="image3" alt="Blink LEDs" /></td>
<td>MS350-48FP-HW</td>
</tr>
<tr>
<td>IDF 5.2.15</td>
<td><img src="image4" alt="Blink LEDs" /></td>
<td>MS350-48FP-HW</td>
</tr>
</tbody>
</table>

**Managing Stack Members**

To add or remove Stack Members simply click on the Manage Members tab and select the switch/es that you want to add or remove from the stack and click either add or remove switches.
Replacing and Cloning Stack Members

The steps below should be used for the following use cases:

- **Replacing a Stack Member**
  - A stacked switch has failed and needs to be replaced.
  - A stacked switch needs to be replaced in a stack with 8 switches.

- **Cloning a Stack Member**
  - A stacked switch needs to be replaced, but the new switch should be up and running before the replacement occurs.
  - A new switch needs to be added and requires the same port configurations of another stack member.

**Note:** All the following instructions are the same for both physical and flexible switch stacks.

**Replacing and Cloning a Stack Member Video**

Media, iframe, embed and object tags are not supported inside of a PDF.
Replacing a Stack Member

The following steps will clone the original stack member and remove it from the stack:

1. Power off the stack member to be replaced
2. Claim the new/replacement switch in the inventory:
   - Navigate to Organization > Inventory
   - Click the Claim button
   - Enter the serial number of the new switch. If replacing multiple members, list all serials
   - Click Claim
3. Add the switch to the network containing the stack
   - Select the switch to be added to the network
   - Click Add to...
   - Select the network and Add to existing

   ![Claim by serial and/or order number]

   - Click Claim

4. *(Optional)* Edit the name of the new switch
   - Navigate to Switch > Switches
   - Select the new switch
   - Click the 
   - next to the title to rename the switch

**Note:** After the switch has been added to the network and before it is added to the stack or replaced, it should be brought online individually and updated to the same firmware build as the rest of the stack. Failing to do so can prevent the switch from stacking successfully. The configured firmware build for the network can be verified under Organization > Firmware Upgrades. A flashing white or green LED on the status light on the switch indicates that a firmware upgrade is in progress.
5. Clone and replace the stack member
   - Navigate to **Switch > Switch stacks**
   - Select the existing stack
   - Navigate to the **Clone and replace member** tab
   - Select the source switch to be replaced
   - Select the destination switch which will replace the source switch

6. Physically swap the switches

The old switch can then be repurposed as a standalone switch or removed from the network

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**Cloning a Stack Member**

The following steps will clone the original stack member without removing it from the stack.

1. Claim the new/replacement switch in the inventory:
   - Navigate to **Organization > Inventory**
   - Click the Claim button
   - Enter the serial number of the new switch. If replacing multiple members, list all serials
• Click **Claim**

2. Add the switch to the network containing the stack
   • Select the switch to be added to the network
   • Click **Add to...**
   • Select the network and **Add to existing**

3. *(Optional)* Edit the name of the new switch
   • Navigate to **Switch > Switches**
   • Select the new switch
   • Click the

   next to the title to rename the switch

4. Clone the stack member
   • Navigate to **Switch > Switches**
   • Select the replacement switch

   ![Stack 1 Switch 2 Replacement](image)

   • Click **Edit > Clone**
   • Select the original stack member
5. Add the new switch to a stack.
   - Navigate to Switch > Switch stacks
   - Select the existing stack
   - Navigate to the Manage members tab. In the Add members section, select the switch to add

   ![Add members](image)

   - Click Add Switches

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**Switch Replacement Walkthrough for Stacks**

Below are instructions for how to copy configurations from a failed switch that is part of a stack and where the network is bound to a template.

1. On the Organization > Configure > Inventory page, claim the new switch and then add the new switch to the existing network.
2. Bind new switch to the template profile.
   - Navigate to the parent template in Dashboard.
   - Navigate to Switch > Configure > Profiles within that template.
   - Click on the corresponding profile.
   - Click the Bind switches button.
   - Click the checkbox next to the new switch and click the Bind to profile button.

3. Firmware upgrade for the new switch.
   - Provide the new switch a physical uplink connection and then power it on. The new switch needs to be brought online as a standalone device, not yet added to the stack so that it can update its firmware.
   - Confirm via the connectivity graph or Support that the switch has upgraded its firmware.
   - While the new switch upgrades, you may proceed with the below steps, stopping before Step 8 until the new switch has had a chance to upgrade.
4. Obtain Current Configuration.

- Navigate to **Switch > Configure > Profiles** within the parent template.
- Click on the profile in question.
- Filter in the **Search switches...** field for the name of the old switch.
- Note the local override configuration. Save in a text editor for use in Step 5.

In the child network, navigate to the **Switch > Monitor > Switch ports** page.

- In the **Search switches...** field, filter by the name of the old switch and select the below column options.
• Then, take screenshots of the port configurations or copy and paste into a spreadsheet or text editor application.

5. Configure replacement switch.

• On the Switch > Monitor > Switch ports page of the child network, configure the switch ports of the new switch based on the configuration gathered in Step 4.

• Once complete, navigate back to the template profile details page from Step 4 and ensure that the local overrides between the old and new switch match.
6. Power down the old switch.
7. Unbind Old Switch from profile.
   - On the template profile details page, click the check box next to the old switch and then click the **Unbind** button.

8. Add the new switch to the stack.
   - After confirming that the new switch has upgraded its firmware as mentioned in Step 3, power down the new switch.
• In the child network, navigate to the **Switch > Monitor > Switch stacks** page.

• Click on the stack in question.

• Click the **Manage members** tab.

• Under **Add members**, click the checkbox next to the new switch and then click the **Add switches** button.

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9. Remove the old switch from the stack.

• In the child network, navigate to the **Switch > Monitor > Switch stacks** page.

• Click on the stack in question.

• Click the **Manage members** tab.

• Click the checkbox next to the old switch and then click the **Remove switches** button.
10. Physically cable and stack the new switch.


**Common Alerts**

Ensure all stack members are configured on dashboard, online and connected via their stacking ports. If connected and configured correctly, the error will disappear within 20-30 minutes. If the error persists, please contact Cisco Meraki Technical Support for further troubleshooting.

**This switch's current stack members differ from the dashboard configuration.**

This error can occur in the following scenarios:

- Stack members are configured on dashboard, but not all members are connected via their stacking ports.
- A stack member has failed or is powered off.

**This switch is not connected to a stack.**

This error can occur in the following scenarios:

- The switch is configured on dashboard as a stack member, but is not connected to a stack.
This switch does not have a stack configuration.

This error can occur in the following scenarios:

- The switch is physically connected as a stack, but not configured on dashboard as a stack member.