

# Stacking on Cisco Catalyst 2960-X and 2960-XR: FlexStack-Plus and FlexStack-Extended

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## Introduction

With today's ever-growing networks, businesses are increasingly faced with the challenge of managing multiple devices spread over a large campus.

Cisco® FlexStack-Extended and FlexStack-Plus technology allows stacked installation of Cisco Catalyst® 2960-X or 2960-XR Series Switches within the same wiring closet, across wiring closets on different floors of a building, or across different buildings in a campus, with a single point of management that reduces IT management overhead.

The Cisco Catalyst 2960-X FlexStack-Plus Stack Module provides high-bandwidth stacking capability over short distances to simplify management and improve resiliency. The Cisco Catalyst 2960-X FlexStack-Extended Stack Module – Hybrid provides investment protection for Cisco Catalyst 2960-X and 2960-XR Series Switches that are already stacked and installed with FlexStack-Plus modules. These modules act as interconnects between FlexStack-Plus and FlexStack-Extended stacked switches.

This white paper describes the different designs for stacking Cisco Catalyst 2960-X and 2960-XR Series Switches with the Cisco FlexStack-Plus and FlexStack-Extended modules to achieve high availability with ease of management within and across wiring closets.

Refer to the configuration guide for detailed configuration commands and examples.

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## The FlexStack Family

The FlexStack-Extended and FlexStack-Plus modules enable stacking within and across wiring closets. Up to eight Cisco Catalyst 2960-X or 2960-XR Series Switches can be stacked, with a single management and control plane. All management tasks, such as configuration, Cisco IOS® Software upgrades, and troubleshooting, can be performed for all stacked switches from a single point of management through a command line or a simple graphical interface with Cisco Catalyst Configuration Professional.

The FlexStack-Plus and FlexStack-Extended modules are simple-to-install plug-and-play modules, with no preset configuration requirements. They simplify troubleshooting of multiple switches spread over large areas of the campus.

The FlexStack-Extended module uses the same rules for stack master election as FlexStack-Plus switches. These modules can be inserted into the stack module slot at the rear of the Cisco Catalyst 2960-X and 2960-XR Series Switches (Figure 1). Up to eight switches can be stacked in a ring topology using the FlexStack-Plus or FlexStack-Extended modules.

**Figure 1.** Stack Module Slot Location



If there is an existing stack of Cisco Catalyst 2960-X or 2960-XR Series Switches, the hybrid FlexStack-Extended module allows you to add new switches across the wiring closet to the same stack. FlexStack-Extended modules (fiber and hybrid) are supported beginning with Cisco IOS Software Release 15.2(6)E. Refer to Tables 25 and 26 in the [Cisco Catalyst 2960-X Series data sheet](#).

### Stacking Modules

Cisco Catalyst 2960-X and Catalyst 2960-XR Series Switches offer three types of stacking modules.

#### 1. FlexStack-Plus Module (C2960X-STACK)

The FlexStack-Plus module (Figure 2) allows stacking over copper and provides high bandwidth of up to 80 Gbps over short distances (up to 3 m [10 ft]). The module supports stacking cable of 0.5 m, 1 m, or 3 m in length (1.5 ft, 3 ft, or 10 ft).

- CAB-STK-E-0.5M= (0.5-m [1.5-ft] cable)
- CAB-STK-E-1M= (1-m [3-ft] cable)
- CAB-STK-E-3M= (3-m [10-ft] cable)

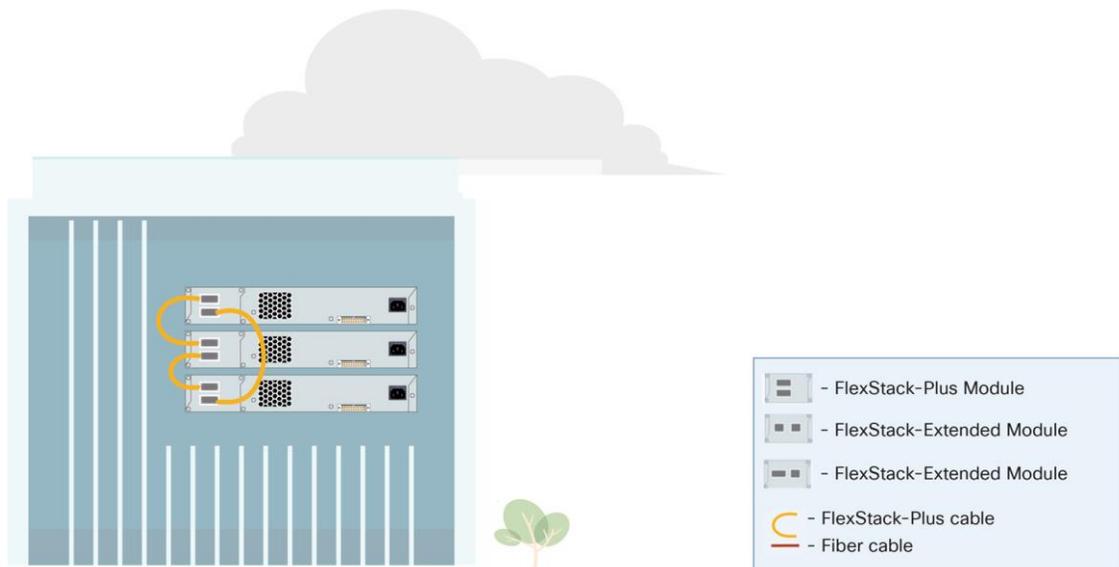
**Figure 2.** FlexStack-Plus Module



### 1.1 Stacking Topologies with FlexStack-Plus Modules

Up to eight Cisco Catalyst 2960-X or 2960-XR Series Switches in a single wiring closet can be stacked in a ring topology with FlexStack-Plus modules and cables (Figure 3). The ring topology helps ensure redundancy for stacking.

**Figure 3.** Short Range High Bandwidth Stacking



## 2. Cisco FlexStack-Extended Fiber Module (C2960X-FIBER-STK):

The module allows stacking over SFP+ ports and provides stacking bandwidth of up to 40 Gbps over longer distance. It can be used to stack switches across wiring closets on different floors of a building or across different buildings in a campus.

The FlexStack-Extended Fiber module has two SFP+ ports. The SFP+ transceivers supported on these ports are listed in the [compatibility matrix](#). Chooses appropriate SFP+ transceivers based on the distance required between switches.

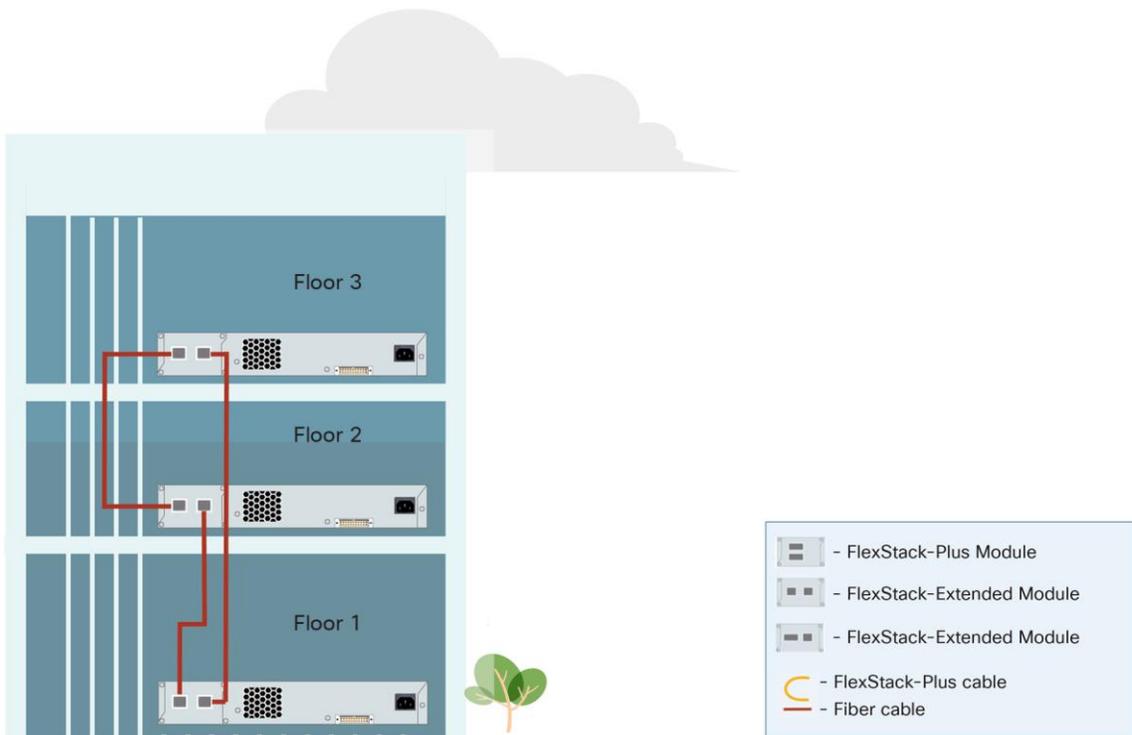
**Figure 4.** FlexStack-Extended Fiber Module



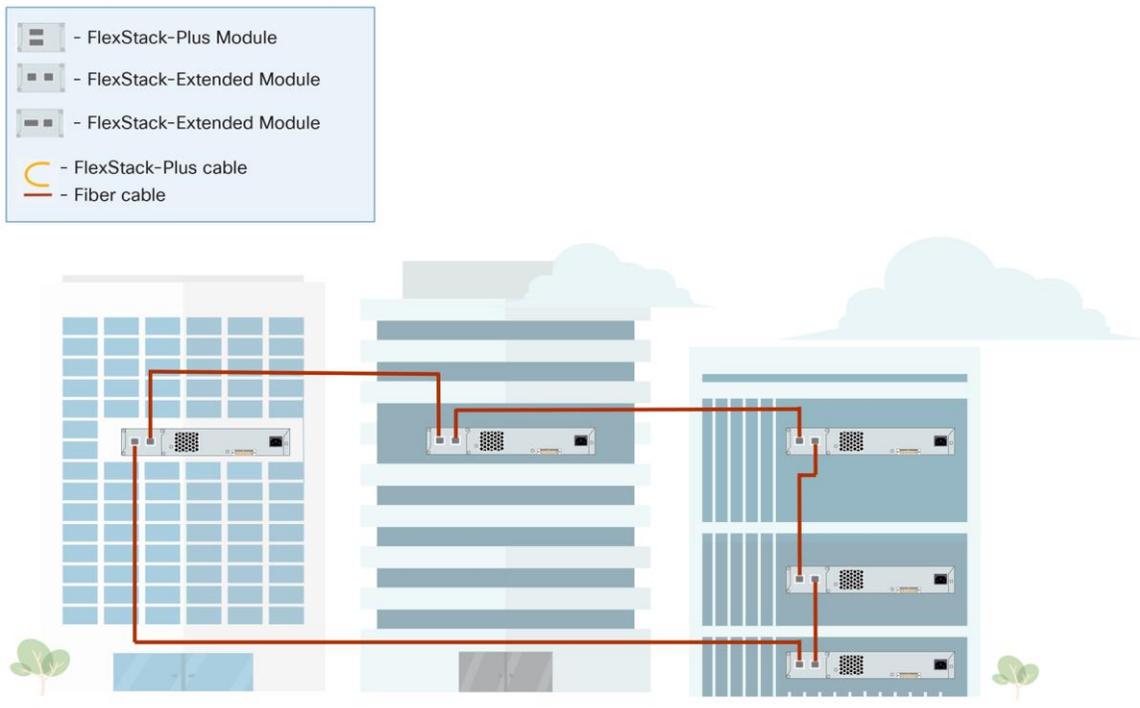
## 2.1 Stacking Topologies with FlexStack-Extended Fiber Modules

Individual Cisco Catalyst 2960-X or 2960-XR Series Switches spread across multiple wiring closets on different floors of a building or in different buildings of a campus can be stacked with the FlexStack-Extended fiber modules (Figures 5 and 6). Up to eight switches can be stacked together. Stacking bandwidth is 40 Gbps.

**Figure 5.** Stacking across Multiple Floors of a Building



**Figure 6.** Stacking across Multiple Floors and Multiple Buildings in a Campus



### 3. FlexStack-Extended Hybrid Module (C2960X-HYBRID-STK)

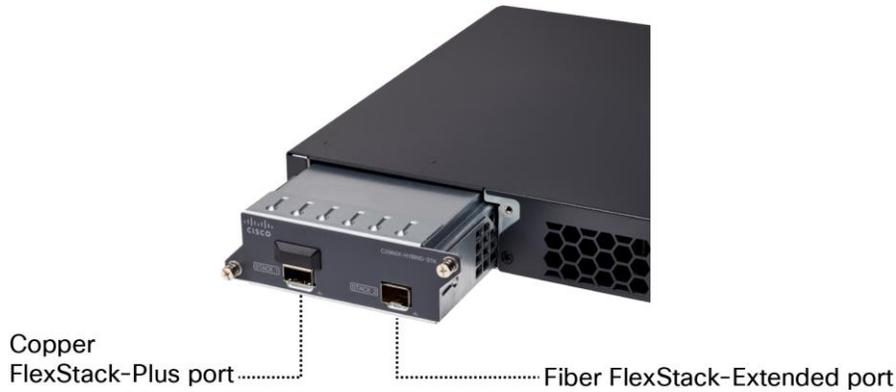
The FlexStack-Extended hybrid module has one SFP+ port and one copper FlexStack-Plus port (Figure 7).

The fiber port allows you to extend stacking over long distances. The SFP+ transceivers supported on these ports are listed in the [compatibility matrix](#). Choose appropriate SFP+ transceivers based on the distance between switches.

The copper FlexStack-Plus port allows the switch to stack with FlexStack-Plus stacks. This port supports the copper FlexStack-Plus cable:

- CAB-STK-E-0.5M= (0.5-m [1.5-ft] cable)
- CAB-STK-E-1M= (1-m [3-ft] cable)
- CAB-STK-E-3M= (3-m [10-ft] cable)

**Figure 7.** FlexStack-Extended Hybrid Module



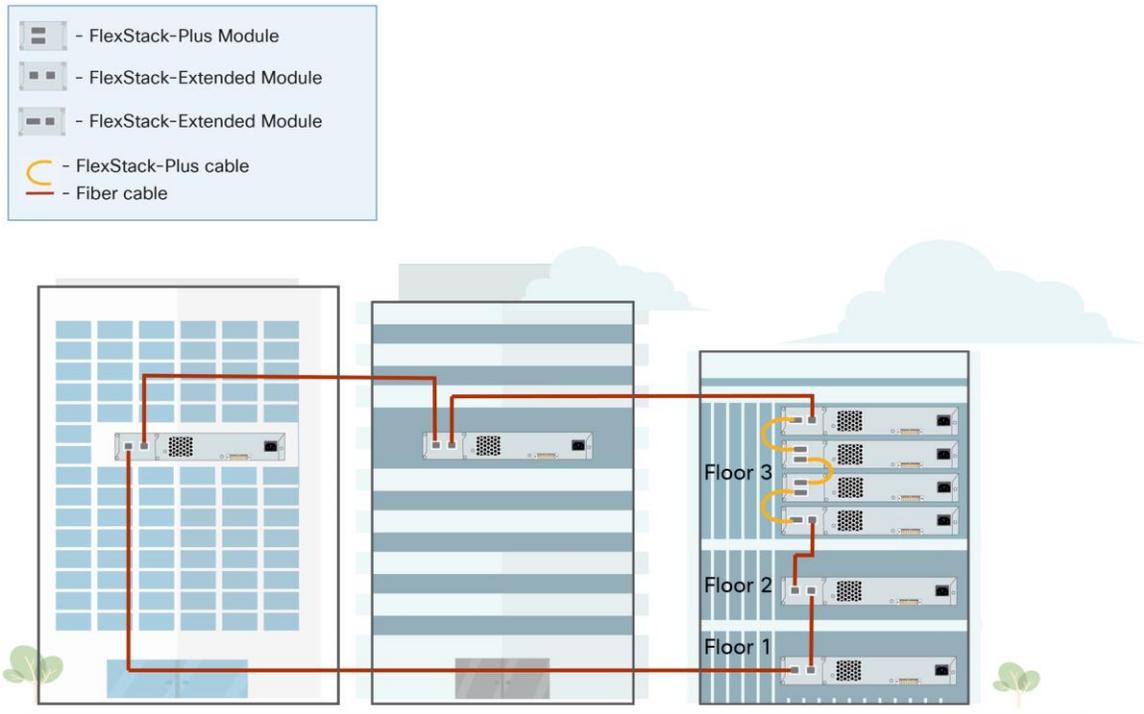
### 3.1 Stacking Topologies with Flexstack-Extended Hybrid Modules

The FlexStack-Extended hybrid module allows you to combine an existing stack of switches and new switches spread across multiple wiring closets on different floors of a building or across multiple buildings of a campus.

The copper FlexStack-Plus port on the FlexStack-Extended hybrid module should be connected to the FlexStack-Plus port on the C2960X STACK module.

The fiber port on the FlexStack-Extended hybrid module can then be used to connect to switches over long distances.

**Figure 8.** Hybrid Stack of FlexStack-Plus and FlexStack-Extended Modules



## Comparison of FlexStack-Plus and FlexStack-Extended Modules

Table 1 presents a comparison of the FlexStack-Plus and FlexStack-Extended modules.

**Table 1.** Comparison of FlexStack-Plus and FlexStack-Extended modules

	FlexStack-Plus module	FlexStack-Extended fiber module	FlexStack-Extended hybrid module
<b>Model</b>	C2960X-STACK	C2960X-FIBER-STK	C2960X-HYBRID-STK
<b>Stack cables</b>	CAB-STK-E-0.5M / CAB-STK-E-1M / CAB-STK-E-3M	Fiber cable based on SFP+ transceiver chosen	Fiber cable based on SFP+ transceiver chosen and CAB-STK-E-0.5M / CAB-STK-E-1M / CAB-STK-E-3M
<b>Distance between stack switches</b>	Short range limited to 3 m (10 ft)	Fiber port ensures long-range connectivity (distance limit based on SFP+ transceiver and fiber used)	1 fiber port ensures long-range connectivity (distance limit based on SFP+ transceiver and fiber used) and short range limited to 3 m (10 ft)
<b>Stack ports</b>	2x 40 Gbps	2x 10 Gbps fiber	1x 40 Gbps and 1x 10 Gbps
<b>Number of switches in stack</b>	8	8	8
<b>Stacking bandwidth</b>	80 Gbps	40 Gbps	40 Gbps
<b>Cisco IOS Software release required</b>		15.2(6)E or later	15.2(6)E or later
<b>Compatible with 2960-S or 2960-S LAN Base</b>	Yes	No	No

## How to Stack Cisco Catalyst 2960-X or 2960-XR Series Switches

- Stack modules are plug and play; no configuration is required to bring up the stack.

Command: “show inventory” to see the modules inserted:

```
switch#show inventory
NAME: "3", DESCR: "WS-C2960XR-48TD-I"
PID: WS-C2960XR-48TD-I , VID: V01 , SN: FOC1720Y3WK
-----Output omitted-----
NAME: "Switch 1 - FlexStackPlus Module", DESCR: "Stacking Module"
PID: C2960X-HYBRID-STK , VID: V01 , SN: FDO211827QG
```

The ports of the modules are in a stack port configuration by default.

Command: “show switch hstack-ports” to ensure that the ports are stack ports.

Example: On the FlexStack-Extended fiber module:

```
Switch#show switch hstack-ports
Horizontal stack port status:
```

Te Ports	Stack Port	Operational Status	Next Reload Status	Media Type
Te3/0/1	NA	N/W Port	N/W Port	Fiber
Te3/0/2	NA	N/W Port	N/W Port	Fiber
Te3/1/1	1	Stack Port	Stack Port	Fiber
Te3/1/2	2	Stack Port	Stack Port	Fiber

Diagram annotations: A bracket groups Te3/0/1 and Te3/0/2 as "Uplink". A bracket groups Te3/1/1 and Te3/1/2 as "Ports from the module".

Example: On the FlexStack-Extended hybrid module:

**Note: The fiber port of the module does not show up with this command.**

```
Switch#show switch hstack-ports
Horizontal stack port status:
```

Te Ports	Stack Port	Operational Status	Next Reload Status	Media Type
Te3/0/1	NA	N/W Port	N/W Port	Fiber
Te3/0/2	NA	N/W Port	N/W Port	Fiber

Diagram annotation: A bracket groups Te3/0/1 and Te3/0/2 as "Uplink".

- When connecting the FlexStack-Extended hybrid module to FlexStack-Plus modules, the stack bandwidth of the switch with the FlexStack-Plus module should be manually configured to 10 Gbps

Command: "switch stack port-speed 10G" to set the stacking bandwidth to 40 Gbps:

```
Example: switch(config)#switch stack port-speed 10
Command: 'show switch stack-ring speed'
Example: switch#show switch stack-ring speed
Stack Ring Speed          : 10G
Stack Ring Configuration: Half
Stack Ring Protocol       : FlexStack
```

- Once the stack cables (fiber or FlexStack-Plus cables) are connected to the switches to stack them:

Command: "show switch" to see all switches in the stack. The master is indicated with an asterisk (\*).

```
switch#show switch
Switch/Stack Mac Address : d0c7.896b.9480
                          H/W   Current
Role  Mac Address      Priority Version  State
-----
```

2	Member d0c7.aaaa.xxxx	1	4	Ready
*3	Master d0c7.bbbb.yyyy	1	4	Ready

Command: “show switch stack-ports” to see the status of the stack ports.

```
Example: switch#show switch stack-ports
```

Switch #	Port 1	Port 2
2	Down	Ok
3	Down	Ok

Ok: Port status up

Down: Port status down

Note: When adding a switch to an existing stack, power off the new switch, connect the stack cables, and then power on the new switch. This will prevent any downtime in the existing stack.

### How to Pick a Stack Module

- If the switches in the stack are less than 3 m (10 ft) apart or high stacking bandwidth is a requirement, the C2960X STACK module would be best suited for stacking
- If the stack switches are spread across wiring closets on different floors of a building or across multiple buildings in a campus (switches are more than 3 m [10 ft] apart), the C2960X-FIBER-STK module would be best suited
- If the stack is a mix of switches in the same wiring closet and switches spread across wiring closets, the stack modules will be a mix of C2960X STACK, C2960X-FIBER-STK, and C2960X-HYBRID-STK

### Points to Remember

- Fast convergence is not supported on stack switches with FlexStack-Extended ports
- The fiber stack ports will support 10-Gbps transceivers only. Refer to the list of supported 10-Gbps transceivers mentioned earlier
- The FlexStack-Extended modules support up to 40-Gbps stack bandwidth over longer distances
- The FlexStack-Plus module supports up to 80-Gbps stack bandwidth over short distances
- When adding a new switch to an existing stack, power off the new switch and then connect the stack cables. This is to prevent reload of the existing stack and stack master reelection
- To use FlexStack-Extended modules, all switches in the stack require upgrade to Cisco IOS Software Release 15.2(6)E or later

### References

Cisco Catalyst 2960-X Series data sheet: [https://www.cisco.com/c/en/us/products/collateral/switches/catalyst-2960-x-series-switches/data\\_sheet\\_c78-728232.html](https://www.cisco.com/c/en/us/products/collateral/switches/catalyst-2960-x-series-switches/data_sheet_c78-728232.html).

FlexStack-Extended configuration guide:

[https://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst2960x/software/15\\_2\\_6\\_e/configuration\\_guide/b\\_1526e\\_consolidated\\_2960x\\_cg/b\\_1526e\\_consolidated\\_2960x\\_cg\\_chapter\\_01010010.html](https://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst2960x/software/15_2_6_e/configuration_guide/b_1526e_consolidated_2960x_cg/b_1526e_consolidated_2960x_cg_chapter_01010010.html).

FlexStack-Plus module: <https://www.cisco.com/c/en/us/support/interfaces-modules/catalyst-2960-x-FlexStack-plus-stack-module/model.html>.



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