CiscoNCS540RouterHardwareInstallationGuide

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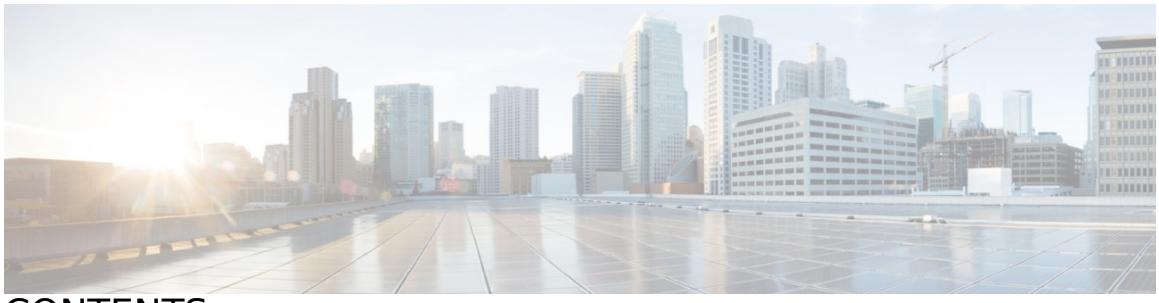


CONTENTS

CHAPTER 1

SafetyWarnings

Thishandoutliststhesafetywarningsnecessaryforhandlingthischassis.Beforeyouinstallorservicethe
chassis,reviewthesesafetywarningstoavoidinjuringyourselfordamagingtheequipment.

Foracompletelistoftranslatedsafetywarnings,seetheRegulatoryComplianceandSafetyInformation—CiscoNCS500SeriesRoutersdocument.

Thesafetywarningsaregroupedunderthefollowingsections:

StandardWarningStatements

Note **Statement407—**JapaneseSafetyInstruction

Youarestronglyadvisedtoreadthesafetyinstructionbeforeusingtheproduct.

https://www.cisco.com/web/JP/techdoc/pldoc/pldoc.html

Wheninstallingtheproduct,usetheprovidedordesignatedconnectioncables/powercables/ACadapters.

〈　品使用における安全上の注意〉

www.cisco.com/web/JP/techdoc/index.html

接続ケーブル、　源コードセット、**AC**アダプタ、バッテリなどの部品は、必ず添付品または指定品をご使用ください。添付品・指定品以外をご使用になると故障や　作不良、火災の原因となります。また、　源コードセットは弊社が指定する　品以外の　気　器には使用できないためご注意ください。

Warning **Statement1003—**DCPowerDisconnection

Toreduceriskofelectricshockorpersonalinjury,disconnectDCpowerbeforeremovingo rreplacing componentsorperformingupgrades.

Warning **Statement1006—**ChassisWarningforRack-MountingandServicing

Topreventbodilyinjurywhenmountingorservicingthisunitinarack,youmusttakespecialpre cautionsto ensurethatthesystemremainsstable.Thefollowingguidelinesareprovidedtoensureyours afety: •Thisunitshouldbemountedatthebottomoftherackifitistheonlyunitintherack.

•Whenmountingthisunitinapartiallyfilledrack,loadtherackfromthebottomtothetop withthe heaviestcomponentatthebottomoftherack.

•Iftherackisprovidedwithstabilizingdevices,installthestabilizersbeforemountingors ervicingthe unitintherack.

Warning **Statement1022—**DisconnectDevice

Toreducetheriskofelectricshockandfire,areadilyaccessibledisconnectdevicemustbeinco rporatedin thefixedwiring.

Warning **Statement1024—**GroundConductor

Thisequipmentmustbegrounded.Toreducetheriskofelectricshock,neverdefeatthegroun dconductoror operatetheequipmentintheabsenceofasuitablyinstalledgroundconductor.Contacttheap propriateelectrical inspectionauthorityoranelectricianifyouareuncertainthatsuitablegroundingisavailable.

Warning **Statement1049—**RackInstallation

Toreducetheriskofbodilyinjury,mountthechassisonarackthatispermanentlyaffixedtothe building.

Warning **Statement9001—**ProductDisposal

Ultimatedisposalofthisproductshouldbehandledaccordingtoallnationallawsandregulatio ns.

Warning **Statement1017—**RestrictedArea

Thisunitisintendedforinstallationinrestrictedaccessareas.Onlyskilled,instructed,orquali fiedpersonnel canaccessarestrictedaccessarea.

Warning **Statement1071—**WarningDefinition

IMPORTANTSAFETYINSTRUCTIONS
Beforeyouworkonanyequipment,beawareofthehazardsinvolvedwithelectricalcircuitryandbefamiliar
withstandardpracticesforpreventingaccidents.Readtheinstallationinstructionsbeforeusing,installing,or
connectingthesystemtothepowersource.Usethestatementnumberatthebeginningofeachwarning statementtolocateitstranslationinthetranslatedsafetywarningsforthisdevice.

SAVETHESEINSTRUCTIONS

Safetyguidelinesforpersonalsafetyandequipmentprotection

Thefollowingguidelinesensureyoursafetyandprotecttheequipment.Thislistdoesnotincludeallthe potentiallyhazardoussituations.Therefore,youmustbealert.

- Beforemovingthesystem,alwaysdisconnectallpowercordsandinterfacecables.
- Neverassumethatpowerisdisconnectedfromacircuit;alwayscheck.
- Beforeandafterinstallation,keepthechassisareacleananddustfree.
- Keeptoolsandassemblycomponentsawayfromwalkareaswhereyouorotherscantripoverthem.
- Donotworkaloneifpotentiallyhazardousconditionsexist.
- Donotperformanyactionthatcreatesapotentialhazardtopeopleormakestheequipmentunsafe.
- Donotwearlooseclothingthatmaygetcaughtinthechassis.
- Whenworkingunderconditionsthatmaybehazardoustoyoureyes,wearsafetyglasses.

Safetyprecautionsformoduleinstallationandremoval

Besuretoobservethefollowingsafetyprecautionswhenyouworkonthechassis.

Warning **Statement1006—**ChassisWarningforRack-MountingandServicing

Topreventbodilyinjurywhenmountingorservicingthisunitinarack,youmusttakespecialprecautionsto ensurethatthesystemremainsstable.Thefollowingguidelinesareprovidedtoensureyoursafety: •Thisunitshouldbemountedatthebottomoftherackifitistheonlyunitintherack.

•Whenmountingthisunitinapartiallyfilledrack,loadtherackfromthebottomtothetop withthe heaviestcomponentatthebottomoftherack.

•Iftherackisprovidedwithstabilizingdevices,installthestabilizersbeforemountingorservicingthe unitintherack.

Warning **Statement1008—**Class1LaserProduct

ThisproductisaClass1laserproduct.

Warning **Statement1089—**InstructedandSkilledPersonDefinitions

Aninstructedpersonissomeonewhohasbeeninstructedandtrainedbyaskilledpersonandtakesthenecessary precautionswhenworkingwithequipment. Askilledpersonorqualifiedpersonnelissomeonewhohastrainingorexperienceintheequipmenttechnology andunderstandspotentialhazardswhenworkingwithequipment.

Therearenoserviceablepartsinside.Toavoidriskofelectricshock,donotopen.

Warning **Statement1090—**InstallationbySkilledPerson

Onlyaskilledpersonshouldbeallowedtoinstall,replace,orservicethisequipment.Seestatement1089for thedefinitionofaskilledperson.

Therearenoserviceablepartsinside.Toavoidriskofelectricshock,donotopen.

Safetywithelectricity

Warning **Statement1003—**DCPowerDisconnection

Toreduceriskofelectricshockorpersonalinjury,disconnectDCpowerbeforeremovingorreplacing componentsorperformingupgrades.

Warning **Statement1022—**DisconnectDevice

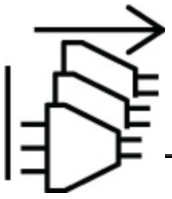
Toreducetheriskofelectricshockandfire,areadilyaccessibledisconnectdevicemustbeincorporatedin thefixedwiring.

Warning **Statement1024—**GroundConductor

Thisequipmentmustbegrounded.Toreducetheriskofelectricshock,neverdefeatthegroundconductoror operatetheequipmentintheabsenceofasuitablyinstalledgroundconductor.Contacttheappropriateelectrical inspectionauthorityoranelectricianifyouareuncertainthatsuitablegroundingisavailable.

Warning **Statement1028—**MoreThanOnePowerSupply

Thisunithmighthavemorethanonepowersupplyconnection.Toreduceriskofelectricshock, removeall connectionstode-energizetheunit.



Warning **Statement1046—**InstallingorReplacingtheUnit

Toreduceriskofelectricshock,wheninstallingorreplacingtheunit,thegroundconnectionmustalwaysbe madefirstanddisconnectedlast.

Ifyourunithasmodules,securethemwiththeprovidedscrews.

Warning **Statement2004—**GroundedEquipment

Thisequipmentisintendedtobegroundedtocomplywithemissionandimmunityrequirements.Ensurethat theswitchfunctionalgroundlugisconnectedtoearthgroundduringnormaluse.

Warning **Statement1073—**NoUser-ServiceableParts

Therearenoserviceablepartsinside.Toavoidriskofelectricshock,donotopen.

Warning **Statement1074—**ComplywithLocalandNationalElectricalCodes

Toreduceriskofelectricshockorfire,installationoftheequipmentmustcomplywithlocalan dnational electricalcodes.

Whenworkingonequipmentthatispoweredbyelectricity,followtheseguidelines:

•Locatetheroom’semergencypower-offswitch.Ifanelectricalaccidentoccurs,youknowwhereto quicklyturnoffthepower.

•Beforestartingworkonthesystem,turnofftheDCmaincircuitbreakeranddisconnectthep ower terminalblockcable.

•Disconnectallpowerwhen:

•Workingonornearpowersupplies

•Installingorremovingadevicechassisornetworkprocessormodule

•Performingmosthardwareupgrades

•Neverinstallequipmentthatappearsdamaged.

•Carefullyexamineyourworkareaforpossiblehazards,suchasmoistfloors,ungroundedp owerextension cables,andmissingsafetygrounds.

•Neverassumethatpowerisdisconnectedfromacircuit;alwayscheck.

•Neverperformanyactionthatcreatesapotentialhazardtopeopleormakestheequip mentunsafe.•Ifanelectricalaccidentoccursandyouareuninjured:

•Usecautiontoavoidinjuringyourself.

•Turnoffpowertothedevice.

•Seekmedicalattention,ifnecessary.

Usethefollowingguidelineswhenworkingwithanyequipmentthatisdisconnectedfromapo wersource, butconnectedtotelephonewiringornetworkcabling:

•Wheninstallingormodifyingtelephonelines,usecaution.

•Neverinstalltelephonejacksinwetlocationsunlessthejackisdesignedtohandlesuc hlocations.•Neverinstalltelephonewiringduringalightningstorm.

Powersupplyconsiderations

Checkthepoweratyoursitetoensurethatyouarereceivingcleanpower(freeofspikesan dnoise).If necessary,installapowerconditioner.

PowerConnectionGuidelines

Thissectionprovidesguidelinesforconnectingthedevicepowersuppliestothesitepowersource.

Warning **Statement1024—**GroundConductor

Thisequipmentmustbegrounded.Toreducetheriskofelectricshock,neverdefeatthegroundconductoror operatetheequipmentintheabsenceofasuitablyinstalledgroundconductor.Contacttheappropriateelectrical inspectionauthorityoranelectricianifyouareuncertainthatsuitablegroundingisavailable.

GuidelinesforDC-PoweredSystems

BasicguidelinesforDC-poweredsystemsincludethefollowing:

•Eachchassispowersupplyhasitsowndedicatedinputpowersource.Thesourcemustcomplywiththe safetyextra-lowvoltage(SELV)requirementsintheUL60950-1,UL62368-1,CSA60950-1,CSA 62368-1,EN60950-1,EN62368-1,IEC60950-1,andIEC62368-1standards.

•Protectthecircuitbyadedicatedtwo-poleDCcircuitbreaker.Ensurethatthecircuitbreakerissized accordingtothepowersupplyinputratingandlocalornationalcoderequirements.

•Thecircuitbreakerisconsideredasthedisconnectdeviceandiseasilyaccessible.

•Thesystemgroundisthepowersupplyandchassisground.

•UsethegroundinglugtoattachawriststrapforESDprotectionduringservicing.

•DonotconnecttheDCreturnwiretothesystemframeortothesystem-groundingequipment. •EnsurethattheDCreturnisgroundedatthesourceside.

•Ensurethateachpowerfeedoftheequipmentisconnectedtodifferentpowersources.

GuidelinesforAC-PoweredSystems

BasicguidelinesforAC-poweredsystemsincludethefollowing:

•Eachchassispowersupplyhasitsowndedicatedbranchcircuit.

•Ensurethatthecircuitbreakerissizedaccordingtothepowersupplyinputratingandlocalornational coderequirements.

•TheACpowerreceptaclesthatareusedtopluginthechassismustbethegroundingtype.Thegrounding

conductorsthatconnecttothereceptaclesmustconnecttoprotectiveearthgroundattheserviceequipment.

PreventPowerLoss

Usethefollowingguidelinestopreventpowerlosstothedevice:

•Topreventinputpowerloss,ensurethatthemaximumloadoneachcircuitsupplyingthepoweriswithin thecurrentratingsofthewiringandbreakers.

- Insomesystems,youcanuseanUPStoprotectagainstpowerfailuresatyoursite.AvoidUPS types thatuseferroresonanttechnology.TheseUPStypescanbecomeunstablewithsystemssuchasthedevice, whichcanhavesubstantialcurrent-drawfluctuationsduetoburstydatatrafficpatterns.

Determiningpowerrequirementsisusefulforplanningthepowerdistributionsystemtosupportthedevice.

PreventingESDdamage

ElectrostaticDischarge(ESD)candamageequipmentandimpairelectricalcircuitry.ESDmayoccurwhen electronicprintedcircuitcardsareimproperlyhandledandcancausecompleteorintermittentfailures.When removingandreplacingmodules,alwaysfollowtheseESDpreventionprocedures:

- Ensurethatthedevicechassisiselectricallyconnectedtoearthground.
- WearanESD-preventivewriststrap,ensuringthatitmakesgoodskincontact.Tochannelunwanted ESDvoltagessafelytoground,connectthecliptoanunpaintedsurfaceofthechassisframe.Toguard againstESDdamageandshocks,thewriststrapandcordmustoperateeffectively.
- Ifnowriststrapisavailable,groundyourselfbytouchingametalpartofthechassis.
- Wheninstallingacomponent,useanyavailableejectorleversorcaptiveinstallationscrewstoproperly seatthebusconnectorsinthebackplaneormidplane.Thesedevicespreventaccidentalremoval,provide propergroundingforthesystem,andhelptoensurethatbusconnectorsareproperlyseated.
- Whenremovingacomponent,useavailableejectorleversorcaptiveinstallationscrews,ifany,torelease thebusconnectorsfromthebackplaneormidplane.
- Handlecomponentsbyonlytheirhandlesoredges;donottouchtheprintedcircuitboardsorconnectors.
    - Placearemovedcomponentboardsideuponanantistaticsurfaceorinastatic-shieldingcontainer.If youplantoreturnthecomponenttothefactory,immediatelyplaceitinastatic-shieldingcontainer.
- Avoidcontactbetweentheprintedcircuitboardsandclothing.Thewriststraponlyprotectscomponents fromESDvoltagesonthebody;ESDvoltagesonclothingcanstillcausedamage.
- Neverattempttoremovetheprintedcircuitboardfromthemetalcarrier.

Forthesafetyofyourequipment,periodicallychecktheresistancevalueoftheantistaticwriststrap.Maintain thevaluebetween1and10MOhm.

CHAPTER 2

Cisco NCS 540 Router Overview

The Cisco NCS 5401 RU router complements Cisco's offerings for IPRAN solutions for the GSM, UMTS, LTE, and CDMA.

The Cisco NCS 540 includes the following variants.

Table 1: Cisco NCS 540 Variants

Variant	Conformal Coating
N540-24Z8Q2C-SYS	No
N540X-ACC-SYS	Yes[1]
N540-ACC-SYS	No
N540-28Z4C-SYS-A N540-28Z4C-SYS-D	No
N540-12Z20G-SYS-A N540-12Z20G-SYS-D	No
N540X-12Z16G-SYS-A N540X-12Z16G-SYS-D	Yes
N540X-16Z4G8Q2C-A N540X-16Z4G8Q2C-D	Yes

1 The printed circuit boards are conformal coated to provide enhanced protection against stm oisture, dust and corrosive gas. For additional information and deployment conditions, we recommen dyou to contact our Cisco support team.

Note The Cisco N540-24Z8Q2C-SYS, N540X-ACC-SYS, N540-ACC-SYS, N540-28Z4C-SYS-N540-12Z20G-SYS-A/D, N540X-12Z16G-SYS-A/D and N540X-16Z4G8Q2C-A/D are collectively referred ~~to as the Cisco NCS 540 Router in this document. Any differences between the routers are specifically called out.~~

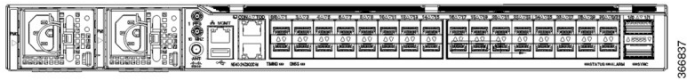
Formoreinformationonitsfeaturesandbenefits,seetheCiscoNetworkConvergenceSystem540Router DataSheet.

NetworkInterfaces

TheCiscoNCS5401RURouterhasthefollowinghardwarefeatures:

- 24x10GSFP+Ports
  - SupportDWDM&ZROptics
- 8x25GSFP+Ports
- 2x100GQSFP28Ports

Figure1:CiscoN540-ACC-SYS



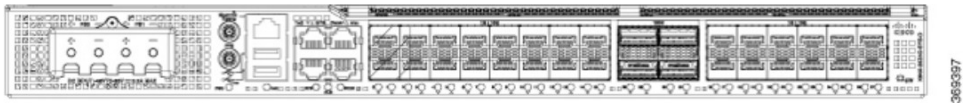
Note Allportsarecolorcodedinthechassisforeaseofaccess;forexample,the10GSFP+Portsarein25GSFP+Portsareinyellow,andthe100GQSFP28Portsareingreen.

TheCiscoN540-28Z4C-SYS-A/D1RURouterhasthefollowinghardwarefeatures:

- 28x1G/10GSFP+Ports
- 4x100GQSFP28PortswithNonMACsec

Figure2:CiscoN540-28Z4C-SYS-A

Figure3:CiscoN540-28Z4C-SYS-D



TheCiscoN540-12Z20G-SYS-A/
D1RURouterhasthefollowinghardwarefeatures:

- 20x1GSFP+Ports
- 12x1G/10GSFP+Ports

Figure4:CiscoN540-12Z20G-SYS-A

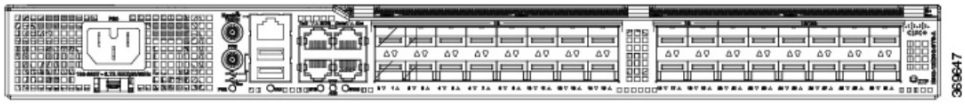
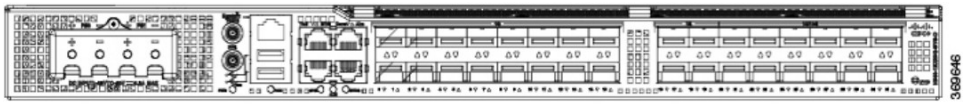


Figure5:CiscoN540-12Z20G-SYS-D



TheCiscoN540X-12Z16G-SYS-A/
D1RURouterhasthefollowinghardwarefeatures:

- 12x1GSFP+Ports
- 12x10G/1GSFP+Ports
- 4x1GCopperPorts

Figure6:CiscoN540X-12Z16G-SYS-A

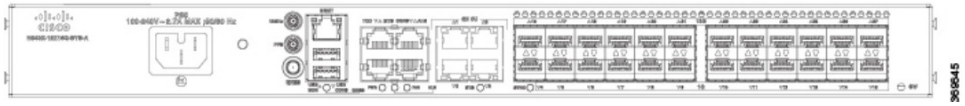
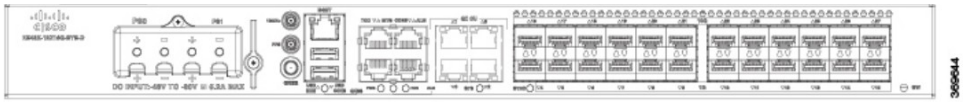


Figure7:CiscoN540X-12Z16G-SYS-D



TheCiscoN540X-16Z4G8Q2C-A/
D1RURouterhasthefollowinghardwarefeatures:

- 4x1GCopperPorts
- 16x1G/10GSFP+Ports
- 8x10G/25GSFP+Ports
- 2x100GQSFPPorts

Figure8:CiscoN540X-16Z4G8Q2C-A

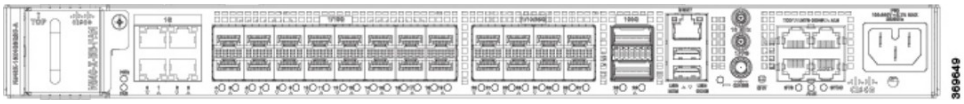
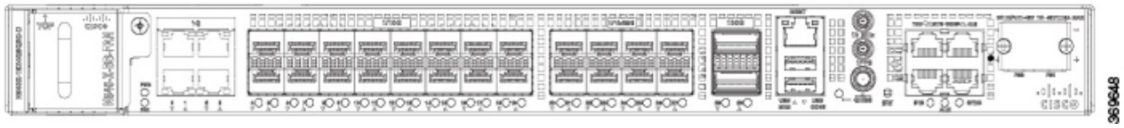


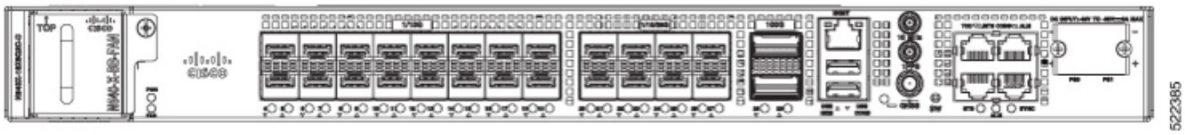
Figure9:CiscoN540X-16Z4G8Q2C-D



TheCiscoN540X-16Z8Q2C-Drouterhasthecopperports(0to3)removed.Therouterhasthefollowing hardwarefeatures:

- 16x1G/10GSFP+Ports
- 8x10G/25GSFP+Ports
- 2x100GQSFPPorts

Figure10:CiscoN540X-16Z8Q2C-D



Specification

Forinformationonphysicalspecification,temperature,RouteProcessor,andotherdetailsfor allvariants,see *CiscoNCS540chassisspecification*inthe CiscoNetworkConvergenceSystem540RouterDataSheet.

InterfaceNaming

ThefollowingtableshowstheinterfacenamingoftheCiscoN540-24Z8Q2C-SYS,N540X-ACC-SYS,and N540-ACC-SYSvariants:

Table2:PortNumbering

1G/10GDualrateports (SFP+)			1G/10G/ 25GDualrateports(SFP28)			40G/100Gports (QSFP28)
0/0	to	22	24	to	30	1/0
1		23	25		0/31	1/1

The*interface-path-id*is*rack*/*slot*/*module*/*port*.Theslashbetweenvaluesisrequiredaspartofthenotation.

- **GigE**—0/0/0/0-0/0/0/31

- **TenGigE**—0/0/0/0-0/0/0/31
- **TwentyFiveGigE**—0/0/0/24-0/0/0/31
- **FortyGigE**—0/0/1/0-0/0/1/1
- **HundredGigE**—0/0/1/0-0/0/1/1

Note Dual-RatefunctionalityissupportedonlywiththeSupportedSFP.

Table3:MaximumNumberofInerfaces

Category	Maximum Interface	PortNumber
100ME copper	24	0/0-23
1GE	32	0/0-31
10GE	32/40*[2]	0/0-31,1/0-1*
25GE	8/16*	0/24-31,1/0-1*
40GE	2	1/0-1
100GE	2	1/0-1

2*4x10GEor4x25GEoption

ThefollowingtableshowstheinterfacenamingoftheCiscoN540-28Z4C-SYS-A/D,N540-12Z20G-SYS-A/D, N540X-12Z16G-SYS-A/D,N540X-16Z4G8Q2C-A/D,andN540X-16Z8Q2C-Dvariants:

Table4:PortNumberingofCiscoN540-28Z4C-SYS-A/D

1G/10GDualrateports (SFP+)	100Gports (QSFP28)
0/0 to 0/27	0/28 to 0/31

- **GigE**—0/0/0/0-0/0/0/27
- **TenGigE**—0/0/0/0-0/0/0/27
- **HundredGigE**—0/0/0/28-0/0/0/31

Table5:PortNumberingofCiscoN540X-12Z16G-SYS-A/D

1GCopper ports	1Gports (SFP)	10Gports (SFP+)
0/0 to 0/3	0/4 to 0/15	0/16 to 0/27

- **GigE**—0/0/0/4-0/0/0/15
- **TenGigE**—0/0/0/16-0/0/0/27

Table6:PortNumberingofCiscoN540-12Z20G-SYS-A/D

1Gports (SFP)	1G/10GDualrateports (SFP+)
0/0 to 0/31	0/20 to 0/31

- **GigE**—0/0/0/0-0/0/0/31
- **TenGigE**—0/0/0/20-0/0/0/31

Table7:PortNumberingofCiscoN540X-16Z4G8Q2C-A/D

1GCopper ports	1G/10GDualrateports (SFP+)	1G/10G/ 25GDualrateports(SFP28)	100Gports (QSFP28)
0/0 to 0/3	0/4 to 0/19	0/20 to 0/27	0/28 and 0/29

- **GigE**—0/0/0/4-0/0/0/27
- **TenGigE**—0/0/0/20-0/0/0/27
- **TwentyFiveGigE**—0/0/0/20-0/0/0/27
- **HundredGigE**—0/0/0/28-0/0/0/29

Table8:PortNumberingofCiscoN540X-16Z8Q2C-D

1G/10GDualrateports (SFP+)	1G/10G/ 25GDualrateports(SFP28)	100Gports (QSFP28)
0/4 to 0/19	0/20 to 0/27	0/28 and 0/29

- **GigE**—0/0/0/4-0/0/0/27
- **TenGigE**—0/0/0/20-0/0/0/27
- **TwentyFiveGigE**—0/0/0/20-0/0/0/27
- **HundredGigE**—0/0/0/28-0/0/0/29

PortSpeedon25GPorts

The25Gportsaredividedintofourquads(0-

3).Eachquadhousesthefollowingports: •Quad0-Ports24-27

- Quad1-Ports28-31
- Quad2-Ports32-35
- Quad3-Ports36-39

LimitationsandImportantGuidelines

- 25Gisthedefaultmodesetonthequad.
- 1Gand10Gcannotcoexistonthesamequadas25G.
- 10Gmodesupportsboth1Gand10G.

Toconfigurethe25Gquadportsinto10Gports,usethefollowingcommand:

```
RP/0/RP0/CPU0:router(config)#hw-modulequadXlocation0/0/CPU0
RP/0/RP0/CPU0:router(config-quad-0x0)#mode10g
```

Xisthenumberofquads(0,1,2,3...n)supported.Eachquadhasadefaultspeedof25G.Youcan configure theportin10Gorrevertto25Gusing`no`formofthecommand:

```
RP/0/RP0/CPU0:router(config)#nohw-modulequadXlocation0/0/CPU0mode10g
```

Note Aquadnumberalwaysstartsfrom0tothemaximumsupportednumber.Thenumberofqua supportedvariesfromplatformtoplatformandtheCLIvalidatesit.Forexample,theNCS540S eriesRouter supportstwoquads(0and1).IfyouenterX=3,theCLIreturnsanerror.

Afteryouconfiguretheport-modespeed,youcanconfigurethe100GEinterface:

- 100G–Eachopticscontrollerconfigurationcreatesasingle100GEport:
  - **interfaceHundredGigE***r*/*s*/*i*/*p*/**0**(where*p*=CTP2port0-5)

    0/3/0/0/0

    0/3/0/1/0

    0/3/0/2/0

    0/3/0/3/0

    0/3/0/4/0

    0/3/0/5/0

NetworkTimingInterfaces

- BITSinputoroutput—TheBITSinterfacessupportclockrecoveryfromeitheraT1at1.544MHzoran E1at2.048MHz,configurablebysoftware.BITSinterfaceisprovidedthroughastandardRJ-48connector onthefrontpanel.
- 1PPSinputoroutputandToDinputoroutput—ThisshieldedRJ-45interfaceisusedforinputoroutput oftime-of-day(ToD)and1PPSpulses.ToDformatincludesbothNTPandIEEE1588-2008timeformats.

ThesameRS422pinsfor1PPSandTODaresharedbetweeninputandoutputdirections.Thedirectionfor eachcanbeindependentlyconfigurablethroughsoftware.

UseanSMBconnectoronthefrontpanelforthefollowing:

- GPS10Mhzinputandoutput—10MHzinputforGPSsynchronization.
- GPS1PPSinputandoutput—1PPSinputforGPSsynchronization.

GNSS

GNSSmodulehasanin-builtESDprotectiononallpins,includingtheRF-inputpin.However,additional surgeprotectionisrequiredifanoutdoorantennaistobeconnected.TheLightningProtector mustsupport alowclampingvoltage(lessthan600V).
Alightningprotectionmustbemountedattheplacewheretheantennacableenters thebuilding.Theprimary lightningprotectionmustbecapableofconductingallpotentiallydangerouselectricalenergytoProtective Earth(PE).
SurgearrestormustsupportDC-passandsuitablefortheGPSfrequencyrange(1.575GHz)withlowattenuation.

GNSSModuleRFInputRequirements

- Foroptimalperformance,theGNSSmodulerequiresanactiveGPS/GNSSantennawithbuilt-in Low-NoiseAmplifier(LNA).TheantennaLNAamplifiesthereceivedsatellitesignalsfortwopurposes: •Compensationoflossesonthecable

- Liftingthesignalamplitudetothesuitablerangeforthereceiverfrontend

TheAmplificationrequiredis22dBgain+cable/connectorloss+Splittersignalloss.

TherecommendedrangeofLNAgain(minusallcableandconnectorlosses)attheconnectorofthe receivermoduleis22dBto30dBwithaminimumof20dBandamaximumof35dB.

- GNSSmoduleprovides5Vtotheactiveantennathroughthesame RFinput.
- Surgerequirement:
  - GNSSmoduleshavebuilt-inESDprotectionsonallpins,includingtheRF-inputpin.However, additionalsurgeprotectionmayberequiredifrooftopantennasaretobeconnected,tomeetthe regulationsandstandardsforlightningprotectionofcountrieswheretheend-productisinstalled.
  - Alightningprotectionmustbemountedattheplacewheretheantennacableenterstheb uilding. Theprimarylightningprotectionmustbecapableofconductingallpotentiallydangerouselectrical energytoPE.
  - SurgearrestorsshouldsupportDC-passandsuitablefortheGPSfrequencyrange(1.575GHz)with lowattenuation.
- AntennaSkyvisibility:
  - GPSsignalscanonlybereceivedonadirectlineofsightbetweenantennaandsatellite. Theantenna musthaveaclearviewofthesky.Forpropertiming,minimumoffoursatellitesshouldbelocked.

Note Theantennaterminalshouldbeearthedatthebuildingentranceinaccordance withtheANSI/NFPA70,theNationalElectricalCode(NEC),inparticularSection 820.93,GroundingofOuterConductiveShieldofaCoaxialCable.

- UseapassivesplitterifmorethanoneGNSSmodulesarefedfromasingleantenna.

Note ThesplittershouldhavealltheRFportscapableofDC-module.

ExternalAlarmInputs

Therouter supportsfourdrycontactalarminputsthroughanRJ-45jackattherearpanel.

- NormallyOpen—indicatesthatnocurrentflowsthroughthealarmcircuitandthealarmisgenerated whenthecurrentisflowing.

Eachalarminputcanbeprovisionedascritical,major,orminor.

Console

The RS 232 console port provides transmission (Tx), reception (Rx), and ground (Gnd).

USB Console

A single USB 2.0 Type-A receptacle on the front panel of the router provides console access to ROMMON, Cisco IOS-XR and diagnostics. While it uses the Type-A connector, it operates as a USB peripheral only for connection to an external host computer. This interface requires the use of a Type-A to Type-A connector instead of a standard USB cable.

Note Use of the USB console is mutually exclusive of the RS 232 console port. This interface requires Type-A to Type-A USB cable.

Online Insertion and Removal

The routers supports the following Online Insertion and Removal (OIR) operations:

- When an SFP is removed, there is no effect on traffic flowing on other ports.
- When an SFP is installed, the system initializes that port for operation based on the current configuration. If the inserted SFP is incompatible with the current configuration of that port, the port does not become operational until the configuration is updated.
- When both power supplies are installed and active, the load may be shared between them or as single PSU supports the whole load. When a power supply is not working or the input cable is removed, the remaining power supply takes the entire load without disruption.

Graceful Shutdown of DCPSU

If the DC input power to the DCPSU falls below 37V, graceful shutdown of the power supply is initiated, and the chassis is shutdown. To power up the chassis again, shut off the DC circuit at the circuit breaker, then turn on the DC circuit. The chassis will power up if the DC input power is above 41V to 54V.

Graceful shutdown is supported only on the following NCS 540 routers:

- N540-24Z8Q2C-SYS
- N540X-ACC-SYS
- N540-ACC-SYS

Note Youcandisablethegracefulshutdownofthe DCPSUusingthe**environmentgraceful-**commandinAdminConfigurationmode.Whengracefulshutdownisdisabled,thechassiswill shutdownif theDCinputpowerfallsbelow37V+/-1V.Thechassiswillrecover(poweronagain)iftheDCinputpower totheDCPSUisabove37Vto54V.Inthismode,thelong-termreliabilityoftheroutercanbeimpactedif theDCinputpowercontinuestofluctuatebetween30Vand54V(resultingincontinuouspower-onand power-offcycles).

SupportedTransceiverModules

Formoreinformationonthesupportedtransceivermodules,seeTransceiverModuleGroup (TMG) CompatibilityMatrix.Inthe**BeginyourSearch**searchbox,enterthekeywordNCS540and click**Enter**.

CHAPTER 3

Prepare for Installation

Before you install the Cisco NCS 540, you must prepare your site for the installation.

Preparing your site involves these setup tasks:

General Precautions

Observe the following general precautions when using and working with your chassis:

- Keep your system components away from radiators and heat sources, and do not block cooling vents.
- Do not spill food or liquids on your system components, and never operate the product in a wet environment.
- Do not push any objects into the openings of your system components. Doing so can cause fire or electric shock by shorting out interior components.
- Position system cables and power supply cable carefully. Route system cables and the power supply cable and plugs so that they are not stepped on or tripped over. Ensure that nothing is rest on your system component cables or power cable.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local and national wiring rules.
- If you turn off your system to avoid damage to the system components, wait at least 30 seconds before turning it on again.

SitePlanningChecklist

Usethefollowingchecklisttocarryoutallsiteplanningtasks:

- Thesitemeetsenvironmentalrequirements.
- Thesite’sairconditioningsystemcancompensatefortheheatdissipationofthechassis.
- Thefloorspacethatthechassisoccupiescansupporttheweightofthesystem.
- Electricalservicetothesitecomplieswiththesafetywithelectricityrequirements.
- Theelectricalcircuitservicingthechassiscomplieswiththepowersupplyrequirements.
- ConsoleportwiringandcablinglimitationshavebeenconsideredinaccordancetoTIA/EIA-232F.
- ThechassisEthernetcablingdistancesarewithinprescribedlimits.
- Theequipmentrackwherethechassisistobeinstalledcomplieswithprescribedrequirements.
- Thefollowingfactorshavebeencarefullyconsideredwhenselectingrack:location,safety,easeof maintenance,andproperairflow.

EnvironmentalRequirements

Note Theoutsideplantinstallationisnotsupportedon CiscoN540-28Z4C-SYS-A/D,andN540-routers.

Foroutsideplantinstallation(cellsitecabinet,hut,andsoon),youmustprotecttherouteragainstairborne contaminants,dust,moisture,insects,pests,corrosivegases,pollutedair,orotherreactiveelements.Sealed equipmentchamberwithair-conditioningoraheatexchangerisrecommendedforOSPdeployments.The equipmentchambermustcomplywiththetemperatureandclearancerequirements.Toachievethislevelof protection,werecommendthattheunitbeinstalledinafullysealedenclosureorcabinet.Examplesofsuch cabinetsincludeIP65cabinetswithheatexchangercomplyingwithTelcordiaGR487.Temperaturemustbe maintainedwithin–40ºCto70ºC.

FormoreinformationonEnvironmentalpropertiesandRegulatorystandards,seetheCiscoNetwork ConvergenceSystem540RouterDataSheet.

AirflowGuidelines

Coolairiscirculatedthroughtherouterbyfansthatarelocatedalongthebacksideoftherouter. Theinternal fansmaintainacceptableoperatingtemperaturesfortheinternalcomponentsbydrawingincoolairthrough thevents,andcirculatingtheairthroughtherouter.

Toensureadequateairflow,itisrecommendedthatyoumaintainaminimumclearancedistancealways,as mentionedinthefollowingfigure.

- Frontclearance—5inches(12.7centimeters)

- Rearclearance—2inches(5.08centimeters)

Figure11:TopViewofClearance

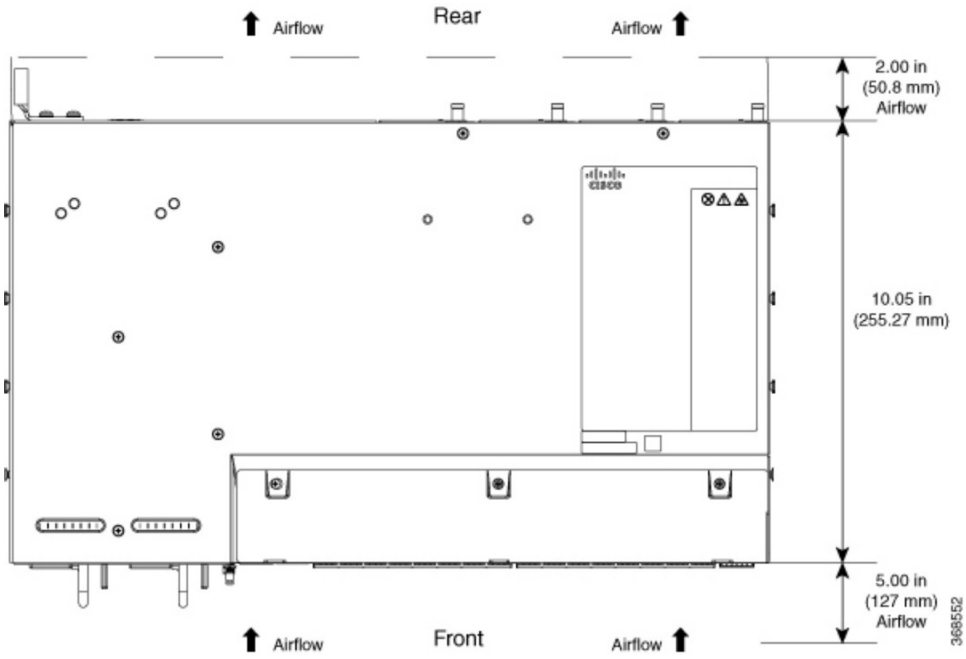


Figure12:SideViewofClearance

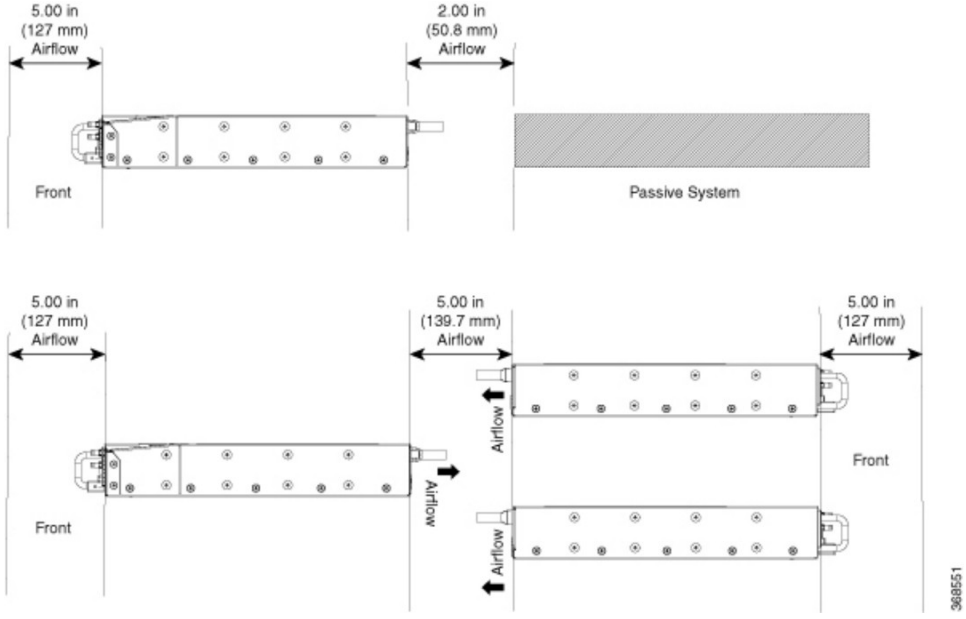


Figure13:AirflowSideView

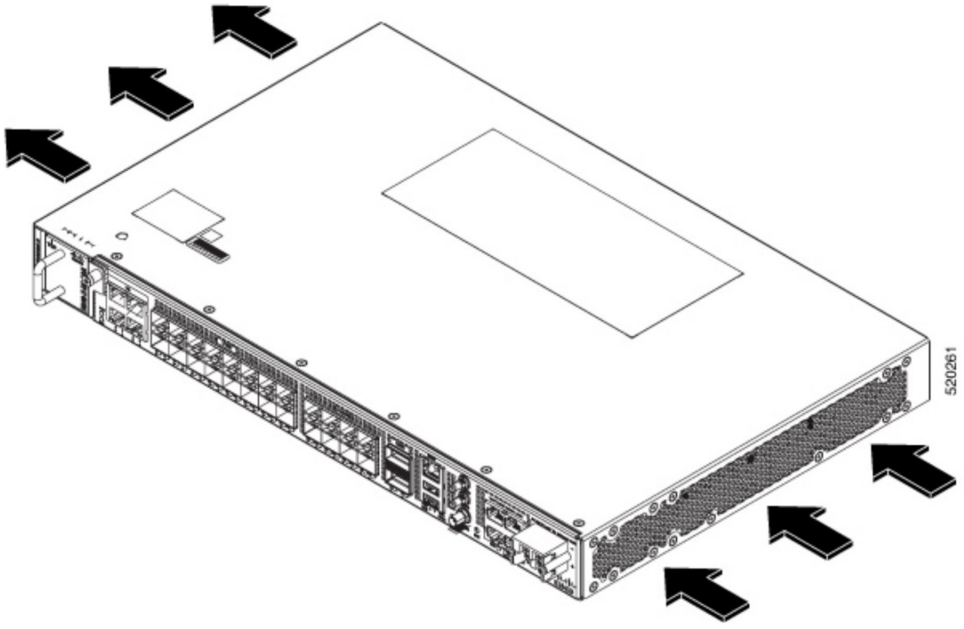


Table9:AirflowGuidelines

Router	Flow Direction	AirClearance
N540X-16Z4G8Q2C-A N540X-16Z4G8Q2C-D N540X-12Z16G-	RighttoLeft	Atleast3inches(7.62centimeters)requiredonbothinletandexit directions.

Notethefollowingpoints:

- Wheninstallingtherouterinaback-to-backpositionwithanotherdevice,ensurethatthereisaminimum of3.9inches(10centimeters)airflowclearancebetweenthetwodevices.
- Ifairflowthroughtheequipmentrackandtheroutersthatoccupyitisblockedorrestricted, orifthe ambientairbeingdrawnintotherackistoowarm,anovertemperatureconditionmayoccurwithinthe rackandtheroutersthatoccupyit.
- Thesitemustbeasdust-freeaspossible.Dusttendstoclogtherouterfans,reducingtheflowofcooling airthroughtheequipmentrackandtheroutersthatoccupyit,thusincreasingtheriskofan overtemperature condition.
- Enclosedracksmusthaveadequateventilation.Ensurethattherackisnotcongestedbecauseeachrouter generatesheat.Anenclosedrackmusthavelouveredsidesandafantoprovidecoolingair.Theequipment generatesheatnearthebottomoftherack,whichcanbedrawnupwardintotheintakeportsofthe equipmentabove.

- Whenmountingarouterinanopenrack,ensurethattherackframedoesnotblocktheexhaustfans.
- Whenrack-installedequipmentfails,especiallyequipmentinanenclosedrack,tryoperatingtheequipment byitself,ifpossible.Poweroffalltheotherequipmentintherack(andinadjacentracks)togivethe routermaximumcoolingairandcleanpower.
- Avoidinstallingtherouterinalocationinwhichtherouterairintakeeventsmaydrawintheexhaustair fromadjacentequipment.Considerhowtheairflowsthroughtherouter;theairflowdirectionisfrontto back,withambientairdrawninfromtheventslocatedonthesidesoftherouter.

SitePowerGuidelines

Thechassishasspecificpowerandelectricalwiringrequirements.Adheringtotheserequirementsensures reliableoperationofthesystem.Followtheseprecautionsandrecommendationswhenplanningyoursite powerforthechassis:

- Theredundantpoweroptionprovidesasecond,identicalpowersupplytoensureuninterrupted power supply.
- Connecteachpowersupplytoaseparateinputpowersource.Otherwise,itresultsintotalpowerfailure tothesystemduetoafaultintheexternalwiringoratrippedcircuitbreaker.
- Topreventlossofinputpower,ensurethatthemaximumloadoneachcircuitiswithinthecurrentratings ofthewiringandthebreakers.
- Checkthepoweratyoursitebeforeinstallation,andperiodicallyafterinstallation,toensureth atyou’re receivingcleanpower.Ifnecessary,installapowerconditioner.
- Providepropergroundingtoavoidpersonalinjuryanddamagetotheequipmentduetopowersurgesor lightningstrikingpowerlines.Thechassisgroundmustbeattachedtoacentralofficeorotherinterior groundsystem.

Note Thechassisinstallationmustcomplywithalltheapplicablecodes,andisapprovedforusewithconductors.Thegroundbond-fasteninghardwaremustbecompatibleandprecludeloosening,deterioration, andelectrochemicalcorrosionofhardwareandjoinedmaterial.Attachmentofthechassisgroundtoacentral officeorotherinteriorgroundsystemmustbemadewitha6-AWGgaugewirecoppergroundconductor.

Caution Thisproductrequiresanexternalsurgeprotectiondeviceforbothacandcdcpowerfeedstoth ForaDCpowerfeed,thesurgeprotectivedevice(SPD)musthandlecommonmodeanddifferentialmode surgeasperthelocalstandards.

⚠

Caution TheACPSUrequiresexternalsurgeprotectiondevices(SPD)forinstallations,whereanelectr higherthan2KVcommonmodeandhigherthan2KVdifferentialmode.Failuretodosoma yresultin permanentdamagetotherouter.Followingaretheapplicableroutervariants:

- N540-24Z8Q2C-SYS
- N540X-ACC-SYS
- N540-ACC-SYS
- N540X-16Z4G8Q2C-A
- N540X-12Z16G-SYS-A
- N540-28Z4C-SYS-A
- N540X-16Z8Q2C-A
- N540-12Z20G-SYS-A

⚠

Caution TheDCPSUrequiresexternalsurgeprotectiondevices(SPD)forinstallations,whereanelectr higherthan2KVcommonmodeandhigherthan1KVdifferentialmode.Failuretodosoma yresultin permanentdamagetotheproduct.Followingaretheapplicableroutervariants:

- N540-24Z8Q2C-SYS
- N540X-ACC-SYS
- N540-ACC-SYS
- N540X-16Z4G8Q2C-D
- N540X-12Z16G-SYS-D
- N540X-16Z8Q2C-D

Followingaretheapplicableroutervariantsthatrequireexternalsurgeprotectiondevices(SPD),wherean electricalsurgeishigherthan1KVcommonmodeandhigherthan1KVdifferentialmode:

- N540-12Z20G-SYS-D
- N540-28Z4C-SYS-D

ElectricalCircuitRequirements

Eachchassisrequiresadedicatedelectricalcircuit.Ifyouequipthedevicewithdual-powerfeeds,providea separatecircuitforeachpowersupplytoavoidcompromisingthepowerredundancyfeature. ThechassissupportsbothDCsourceoranACsource.Ensurethatequipmentgroundingispresen tandobserve power-stripratings.Makesurethatthetotalampereratingofalltheproductspluggedintothepowerstr ip doesnotexceed80%oftherating.

SiteCablingGuidelines

Thesearetheguidelinesforwiringandcablingatyoursite:

- Whenpreparingyoursitefornetworkconnectionstotherouter,consider:
  - thetypeofcablerequiredforeachcomponent,andthecablelimitations.

    Possiblecabletypesarefiber,thickorthincoaxial,foiltwisted-pair,orunshieldedtwisted-pair cabling.
  - thedistancelimitationsforsignaling,ElectroMagneticInterference(EMI),and connector compatibility.
  - anyadditionalinterfaceequipmentyouneed,suchastransceivers,hubs,switches, modems,Channel ServiceUnits(CSU),orDataServiceUnits(DSU).
- Beforeyouinstalltherouter,keepalltheadditionalexternalequipmentsandcableshandy.Forinformation

  aboutorderingtheseequipmentsandcables,contactaCiscocustomerservicerepresentative.
- Theextentofyournetworkandthedistancesbetweenthenetworkinterfaceconnections depend,inpart, onthefollowingfactors:
  - Signaltype
  - Signalspeed
  - Transmissionmedium
- Thedistanceandratelimitsreferencedinthefollowingsectionsarethe IEEE-recommendedmaximum speedsanddistancesforsignalingpurposes.Usethisinformationasaguidelinewhenplanningyour networkconnections*priorto*installingtherouter.
- Ifwiresexceedtherecommendeddistances,orifwirespassbetweenbuildings,givespecialconsideration totheeffectofalightningstrikeinyourvicinity.Theelectromagneticpulsecausedbylightningorother high-energyphenomenacaneasilycoupleenoughenergyintounshieldedconductorstodestroyelectronic devices.Ifyouhavehadproblemsofthissortinthepast,youmaywanttoconsultexpertsinelectrical surgesuppressionandshielding.

AsynchronousTerminalConnections

Therouterprovidesaconsoleporttoconnectaterminalorcomputerforlocalconsoleaccess.Therouter supportsRS-232asynchronousdatawithdistancerecommendationsspecifiedintheIEEERS-232standard.

InterferenceConsiderations

Whenwiresarerunforanysignificantdistance,thereisariskthatstraysignalswillbeinducedonthewires

asinterference.Ifinterferencesignalsarestrong,theymaycausedataerrorsordam[redacted]equipment.

Thefollowingsectionsdescribethesourcesofinterferenceandhowtominimizetheireffects ontherouter system.

ToolsandEquipment

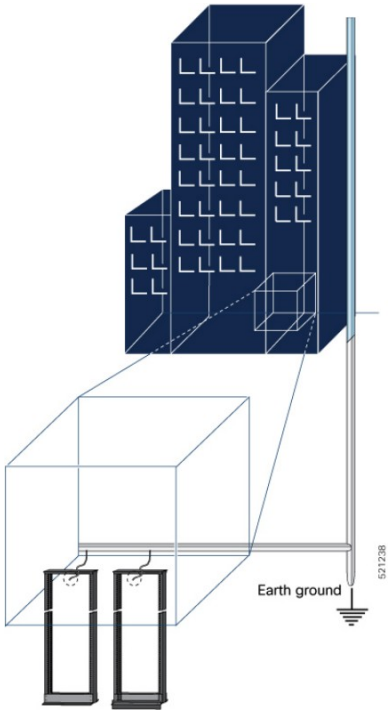
Youneedthefollowingtoolsandequipmenttoinstallandupgradethedeviceanditsco
mponents: •ESD-preventivecordandwriststrap

- •Antistaticmatorantistaticfoam
- •Number1andNumber2Phillips-headscrewdrivers
- •#12-24pan-headscrewstosecurethedevicetotheequipmentrack
- •Cablesforconnectingtonetworkports(basedontheconfiguration)
- •Ethernethub,switch,orPCwithanetworkinterfacecardforconnectingtotheEthernetpor
  ts•Consoleterminalthatisconfiguredfor115200baud,8databits,noparity,noflowcontro
  l,and2stop bits
- •Consolecableforconnectingtotheconsoleport
- •RatchetingtorquescrewdriverwithaPhillipsheadthatexertsupto30-
  poundforcepersquareinch
  (0.02-kilogramsforcepersquaremillimeter(kgf/mm2))ofpressure
- •Crimpingtoolasspecifiedbythegroundlugmanufacturer
- •Wire-strippingtoolsforstrippingboth6and14-AWGwires
- •Tapemeasureandlevel
- •RatchetingtorquescrewdriverwithaPhillipsheadthatexertsupto15inch-
  pounds(1.69newtonmeters) oftorqueforattachingthegroundwiretothedevice

PrepareYourLocation

Thissectionillustrateshowthebuildingthathousesthechassismustbeproperlygroundedtothe
earthground.

Figure14:BuildingwithRackRoomConnectedtoEarthGround

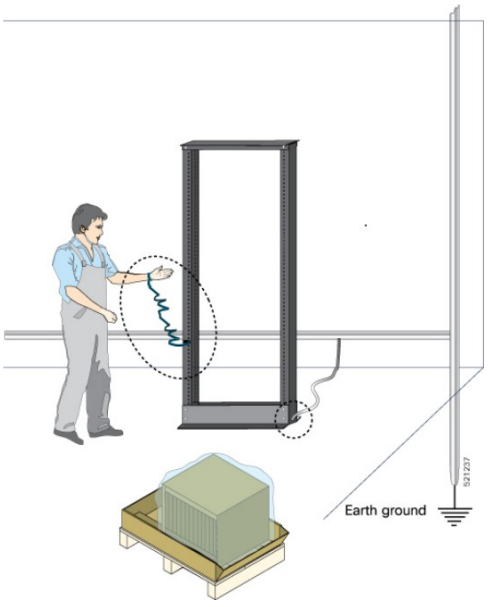


PrepareYourself

Thissectionillustrateshowtoprepareyourselfbeforeremovingthechassisfromthesealedantistaticbag.
Thefiguresshowhowtowear theESDstraparoundthewristandhowtoconnecttheotherendofthestrap
totheground.ESDwriststrapsaretheprimarymeansofcontrollingstaticchargeonpersonnel.

Note:Theseimagesareforonlyrepresentationpurposes.Thechassis'actualappearanceandsizewouldvary.

Figure15:WearingtheESDStrap



PrepareRackforRouterInstallation

Installthechassisintoatwo-poststandardrackwithstandardhorizontalmountingrails.Beforeyoumount thechassisintotherack,werecommendthatyoudothefollowing:

Procedure

Step1 Placetherackwhereyouplantoinstallthechassis.Ensurethattherackisgroundedtoearth.

Step2 Secureracktothefloor.

Tobolttheracktothefloor,afloorboltkit(alsocalledananchorembedmentkit)isrequired.Forinformation bolting theracktothefloor,consultacompanythatspecializesinfloormountingkits(suchasHilti;seeHilti.comfordetails).

Makesurethatfloormountingboltsareaccessible,especiallyifanannualretorquingofboltsisrequired.

CabinetSelectionGuidelines

Equipmentthatisintendedforinstallationincontrolledenvironmentalspacehasaverageyearlylevelsof contamination.Ventilatedcabinetsorrackscanbeusedifpollutantlevelsaremaintainedwithinallowable limits.

Equipmentintendedforinstallationinoutsideplant(OSP)areasmusthavesealedcabinetswithheatexchanger thatmeettheIP66orIP65protectionandlowaverageyearlylevelsofconcentrationofcontaminantsinside thecabinet.

Note VentilatedcabinetsandracksarenotrecommendedforOSPapplications.

Table10:CabinetTypeforIndoorandOutdoorInstallation

CabinetType	SuitableforIndoorInstallation?	SuitableforOutdoorInstallation?
Openrackwithnofrontandrear doors	Yes	No
Ventilatedcabinetswithnormal air filteratintakeandfans	Yes	No
Sealedcabinetswithheat exchangerthatmeetNEMA-4or protection	Yes	Yes
Sealedcabinetswith air-conditionersthatmeetNEMA-4orIP65protection	Yes	Yes

AllowablelimitsforEnvironmentalPollutants
Concentrationofpollutantlevelsinoutdoorandindoorenvironmentmustbelessthanpollutantlevels mentionedinTable2.3andTable2.4of*NEBSGR-63-COREIssue5Dec2017*,respectively.High concentrationsofpollutantshaveanegativeimpactontheequipmentlifetime.

AllowableTemperatureandHumidity
Maximumallowabletemperatureandhumiditylevelsmustbewithinthevaluesthatarementionedinthedata sheets.Donotinstallinplaceswherecondensationmayoccur,orwhereequipmentisexposedtohighhumidity forlongtime,suchasnearthesea,rivers,andlargewaterbodies.

InstallationsinHighly-corrosiveEnvironment
Installationinhighlycorrosiveareaisnotrecommended.Examplesofhighlycorrosiveareasareseashore, lessthan10metersfromhightrafficsroadway,andareashavinghighindustrialpollutants.

PeriodicMeasurementofEnvironmentalPollutants
Werecommendthatyoucheckconcentrationofpollutantsperiodically.Necessaryprotectionshouldbe providedtoensuretheequipmentisnotexposedtohighconcentrationlevelofpollutants.

UnpacktheCiscoNCS540Router

Beforeyoubegin

Ensurethatthereissufficientroomaroundthechassispalletforunpacking.

Procedure

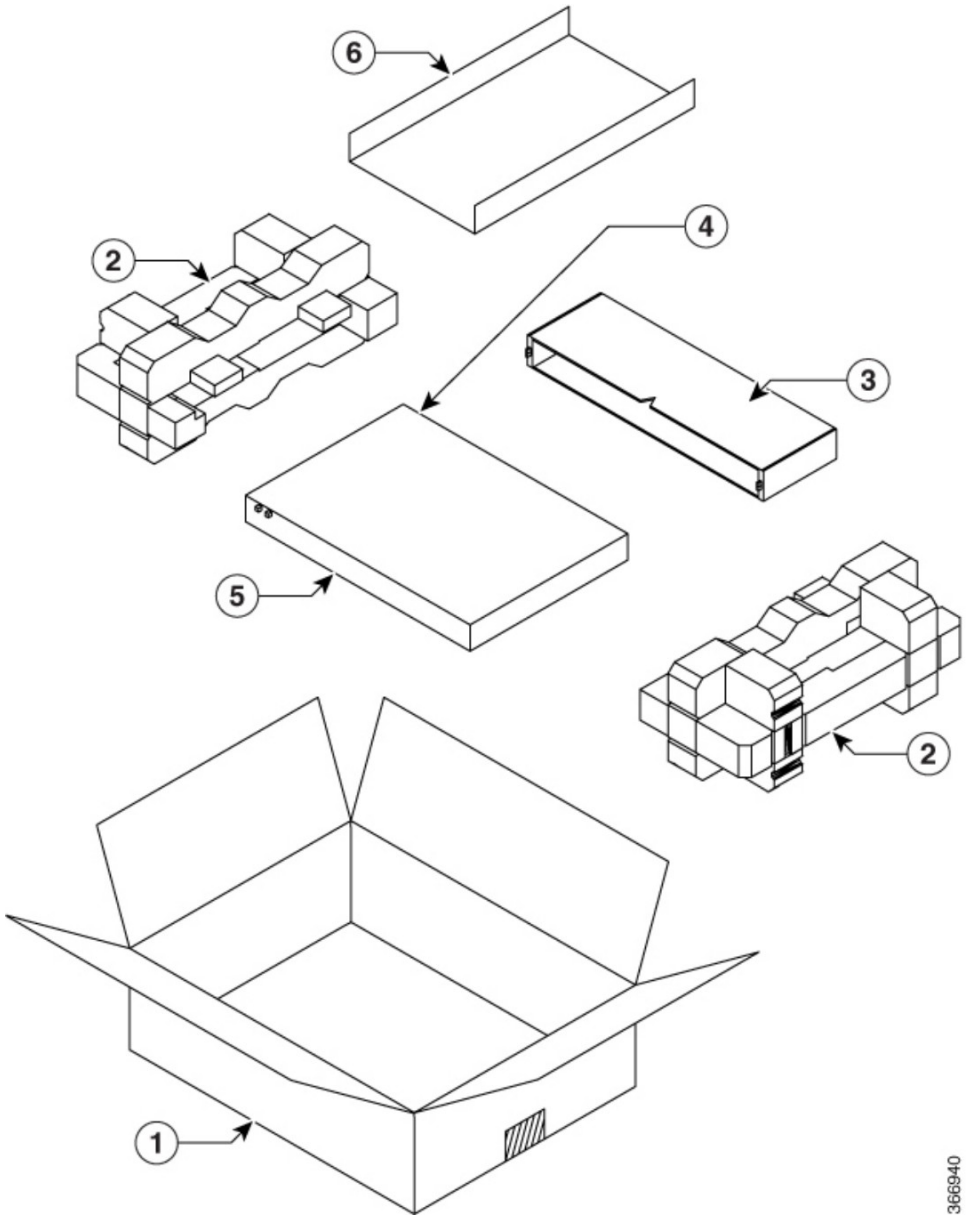
Step1 Removetheaccessorytrayandthepackingmaterial.

Step2 Carefullysetthepackingmaterialaside.

Tip
Besuretosavethepackagingincaseyouneedtoreturnanyofthecomponentsproducts.

Note
Theseimagesareforonlyrepresentationpurposes.Thechassis'actualappearanceandsizewouldvary.

Figure16:UnpackingtheDevice



1	RegularSlottedContainer(shippingbox)	2	Foamendcaps
3	Frontcorrugatedcap	4	Frontendoftheproduct
5	Backendoftheproduct	6	Accessorytray

Whattodonext

Table11:AccessoriesKit

Category	N540-28Z4C-SYS-A/D	N540-12Z20G-SYS-A/D	N540X-16Z4G8Q2C-A/D	N540X-16Z8Q2C-D	N540X-12Z16G-SYS-A/D
19-inchrack mount brackets	N540-RCKMT-19-CLA / N540-RCKMT-19-CLD	N540-RCKMT-19-CLA / N540-RCKMT-19-CLD	N540-RCKMT-19-EGA / N540-RCKMT-	N540-RCKMT-19-EGA / N540-RCKMT-	N540-RCKMT-19-ACA / N540-RCKMT-19-ACD
23-inchrack mount brackets	N540-RCKMT-23-CLA / N540-RCKMT-23-CLD	N540-RCKMT-23-CLA / N540-RCKMT-23-CLD	N540-RCKMT-23-EGA / N540-RCKMT-	N540-RCKMT-23-EGA / N540-RCKMT-	N540-RCKMT-23-ACA / N540-RCKMT-23-ACD
ETSIrack mount brackets	N540-RCKMT-ETSI-CLA / N540-RCKMT-ETSI-CLD	N540-RCKMT-ETSI-CLA / N540-RCKMT-ETSI-CLD	N540-RKMT-ETSI-EGA / N540-RKMT-ETSI-EGD	N540-RKMT-ETSI-EGA / N540-RKMT-ETSI-EGD	N540-RCKMT-ETSI-ACA / N540-RCKMT-ETSI-ACD
Wallmount brackets	N540-WALLMT-CLA	N540-WALLMT-CLA	Notsupported	Notsupported	Notsupported
Cable management brackets	N540-CBL-BRKT-CL	N540-CBL-BRKT-DN	N540-CBL-BRKT-EG	N540-CBL-BRKT-EG	N540-CBL-BRKT-AC

Note MostCiscodocumentationisavailableonline.ThechassisPointerCardthatisshippedwithyo 500SeriesServicesRouterscontainslinksandinformationtootheronlinedocumentation.

Note Iftheproductisnotinuse,storethedeviceintheinitialpackagedconditionorinanESDPEseale silicagel.

ThefollowingaccessorieskitisapplicabletotheCiscoN540-24Z8Q2C-SYS,N540X-ACC-SYS,and N540-ACC-SYSvariants.

Table12:AccessoriesKit

Category	Model
Cablemanagementbrackets	N540-CBL-GD-19 N540-CBL-GD
19-inchrackmount brackets	N540-RCKMT-19
23-inchrackmount brackets	N540-RCKMT-23

Category	Model
ETSIrackmountbracket s	N540-RCKMT-ETSI

CHAPTER 4

Install the Device

Before you begin this task, ensure that you have read and understood the safety warnings in the *Standard Warning Statements* section of the *Safety Warnings* handout topic.

Installing the Cisco NCS 540 involves these setasks:

Note All the installation instructions for Cisco N540-24Z8Q2C-SYS, N540X-ACC-SYS, N540-N540-28Z4C-SYS-A/D, N540-12Z20G-SYS-A/D, N540X-12Z16G-SYS-A/D and N540X-16Z4G8Q2C-A/D variants remains similar and any differences between the routers are specifically called out.

~~The illustrations are for reference purpose only and may vary based on your Cisco NCS 540 vari~~ ant.

Rack Compatibility

We recommend that you follow these rack specifications.

RackTypes

Figure17:RackspecificationEIA(19inchesand23inches)

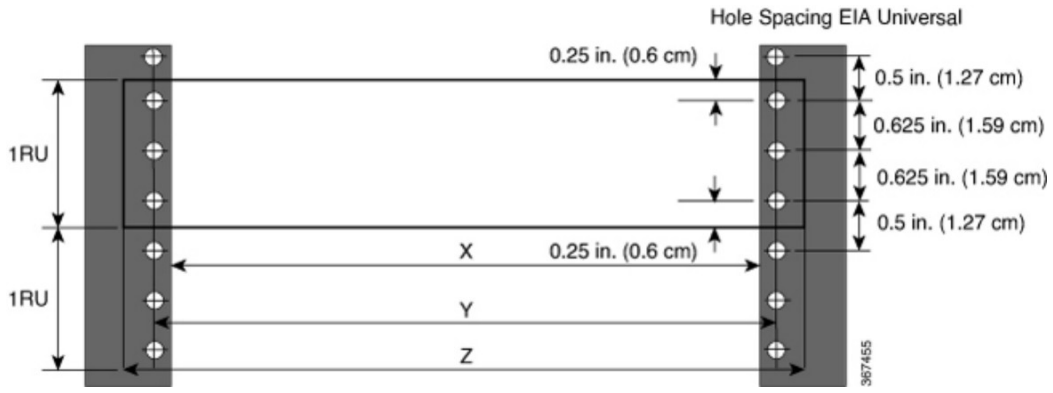


Table13:RackspecificationEIA(19inchesand23inches)

PostType	RackType	RackFrontOpening (X)	RackMountingHole Centre-	MountingFlange Dimension(Z)
4Post	19inches(48.3 centimeters)	17.75inches(45 centimeters)	18.31inches(46.5 centimeters)	19inches(48.2 centimeters)
2Post				
4Post	23inches(58.4 centimeters)	21.75inches(55.24 centimeters)	22.31inches(56.6 centimeters)	23inches(58.4 centimeters)
2Post				

Figure18:FourPostRackType

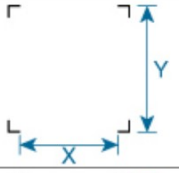
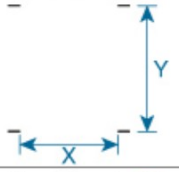
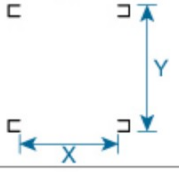
4 – Post Type (Hole EIA Universal)		Width Available (X)	Compatibility
All 23” Type rack		552.45mm (21.75”)	Yes
All ETSI rack (21” rack)		500.0mm (19.68”)	Yes
19” Type rack L-Type Post		17.75” (450.8 mm)	Yes
		17.50” (444.5 mm)	No
19” Type Racks Flat-Post		17.75” (450.8 mm)	Yes
		17.50” (444.5 mm)	No
19” Type racks C- Type Post		17.75” (450.8 mm)	Yes
		17.50” (444.5 mm)	No

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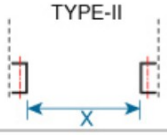
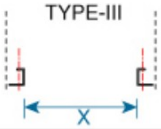
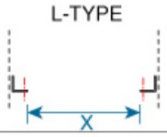
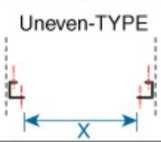
Figure19:TwoPostRackType

2 – Post Type (Hole EIA Universal)	X – 19” Rack	Compatibility	X-23” Rack	Compatibility
TYPE-I 	17.75” (450.8 mm)	Yes	21.75” (552.45mm)	Yes
	17.50” (444.5 mm)	No	21.75” (552.45mm)	Yes
TYPE-II 	17.75” (450.8 mm)	Yes	21.75” (552.45mm)	Yes
	17.50” (444.5 mm)	No	21.75” (552.45mm)	Yes
TYPE-III 	17.75” (450.8 mm)	Yes	21.75” (552.45mm)	Yes
	17.50” (444.5 mm)	No	21.75” (552.45mm)	Yes
L-TYPE 	17.75” (450.8 mm)	Yes	21.75” (552.45mm)	Yes
	17.50” (444.5 mm)	No	21.75” (552.45mm)	Yes
Uneven-TYPE 	17.75” (450.8 mm)	Yes	21.75” (552.45mm)	Yes
	17.50” (444.5 mm)	No	21.75” (552.45mm)	Yes

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SetupDeviceonRackorWall

YoucanchoosetoeithersetuptheCiscoNCS540onarackorwallmountit.

Note WallmountissupportedonlyonCiscoN540-24Z8Q2C-SYS,N540X-ACC-SYS,N540-ACC-N540-28Z4C-SYS-A/D,andN540-12Z20G-SYS-A/Drouters.

Rack-Mount

Thedeviceisshippedwithrackmountingbracketsthataretobesecuredonthesidesofthedevice.

Caution Iftherackisonwheels,ensurethatthebrakesareengagedortherackisotherwisestabili

Table14:CiscoNCS540RouterRack-MountKit

Quantity	PartDescription
2	Rack-mountbrackets
8	M4x0.7x6-mmPhillipsflat-headscrews
3[3]	M3x0.5x4-mmPhillipscountersinkscrews

3TopcoverortheNEBskitisanoptionalaccessorytoimprovetheairflow,henceitmaynotbe apart ofyourstandardpackage.

Note Thedeviceisshippedwiththenewcablemanagementbrackets.Ifyourequiretheoldlongcabl brackets,youneedtoorderA920-CBL-BRKT-H.

Table15:N540X-16Z4G8Q2CA/DRouterRack-MountKit

Quantity	PartDescription
2	Rack-mountbrackets
8	M3x0.5x6-mmPhillipsflat-headscrews

Procedure

Step1 (Optional)AttachthetopcoverortheNEBskitbyusingtheM3screwstothechassis.

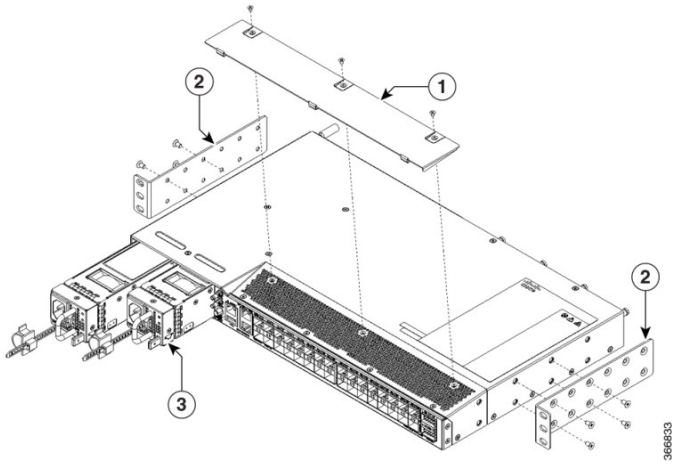
Step2 Attachtherack-mountbracketsandthecableguidestotherouterasfollows:

a) Therouterhasport-

b)Positionthebracketearsfacingfrontormiddlerack-mount,onthesideofthechassissothattheholesarealigned. c) UsefourM4screwstoattachthebracketstothechassis.

d)RepeatSteps1band1cwiththeotherrack-mountbracketontheothersideoftherouter.

Figure20:InstallingRack-MountBrackets



1	TopcoverortheNEBskit	2	Rack-mountbrackets
3	Powersupplyunit	-	-

Figure21:InstallingCableManagementand19inchRack-MountBracketsintheFront

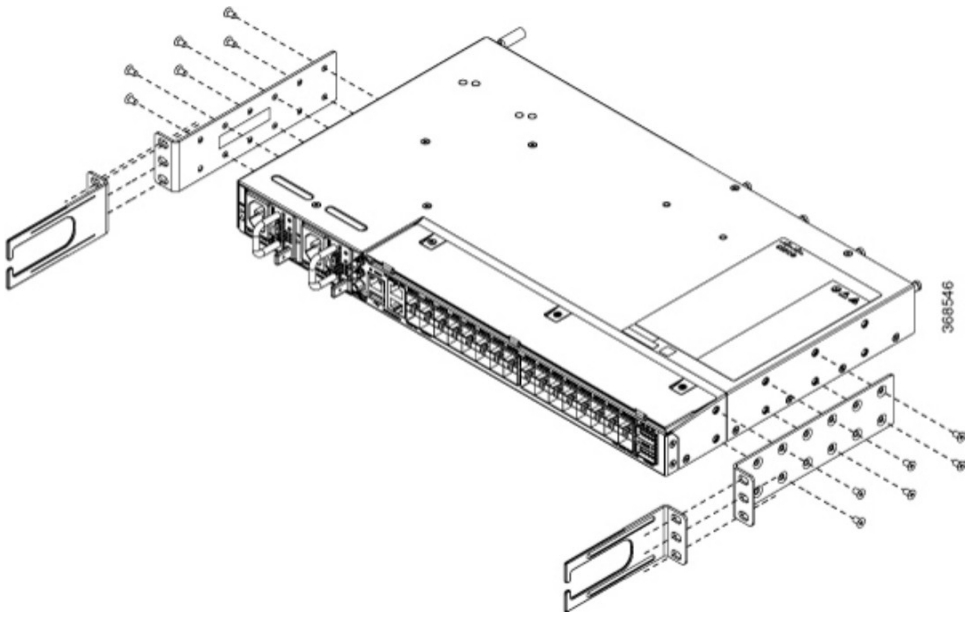


Figure22:InstallingCableManagementand19inchRack-MountBracketsintheMiddle

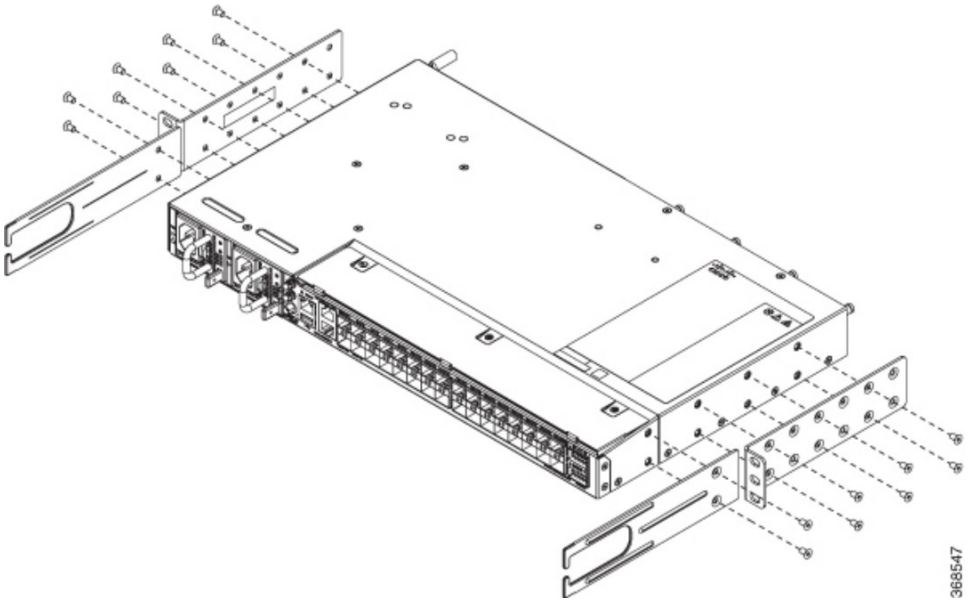


Figure23:Installing19inchRack-MountBracketsintheMiddle(N540X-16Z4G8Q2C-A/D)

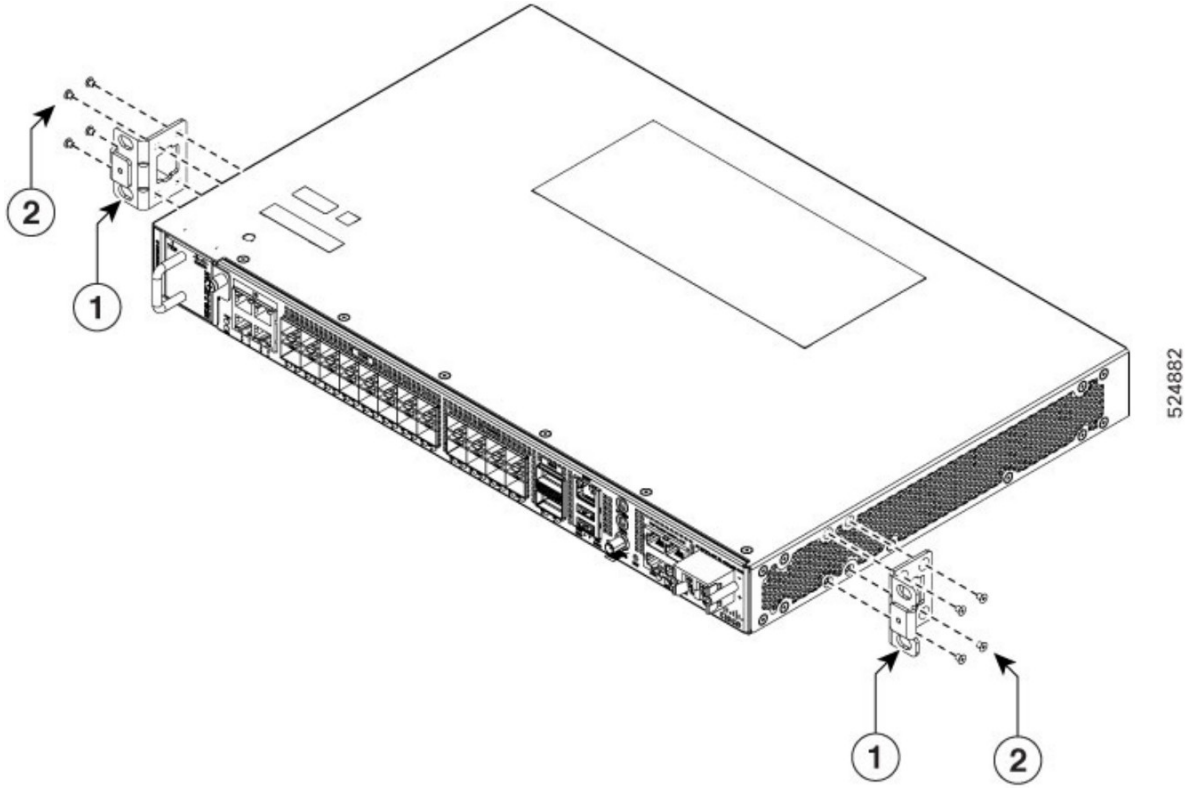


Table16:Requirementforinstallingrack-mountbracketsinthemiddle

SerialNo	PartNumber	Quantity
1	700-118409-01	2
2	48-1363-01	8

Figure24:N540X-16Z4G8Q2C-A/Dchassiswith19inchrack-mountbracketsmountedatthemiddlewithcablemanagementbracketsinthefront

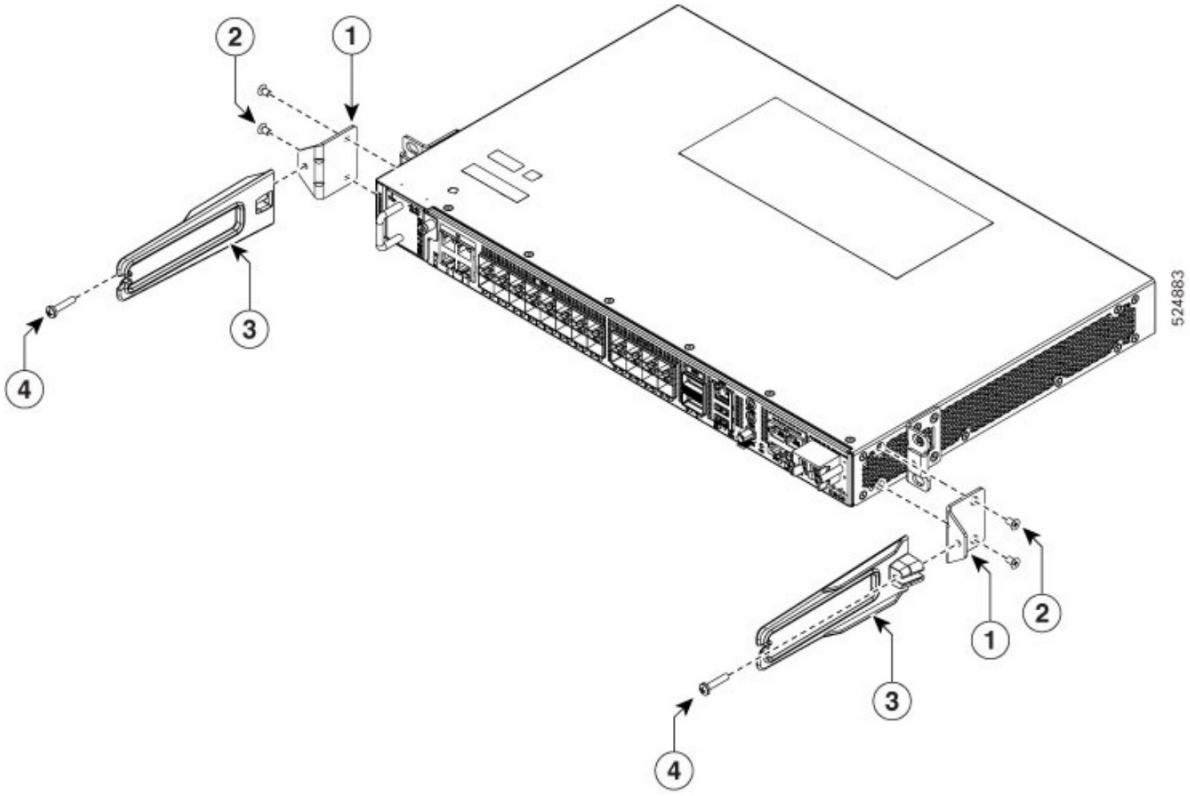


Table17:Requirementforinstallingrack-mountbracketsinthemiddlewithcablemanagementbracketsinthefront

SerialNo	PartNumber	Quantity
1	700-119475-02	2
2	48-1363-01	4
3	700-05613-01	2
4	48-0654-01	2

Figure25:N540X-16Z4G8Q2C-A/Dchassiswith19inchrack-mountanglemountedatthemiddleinstalledontwopost19inchrack

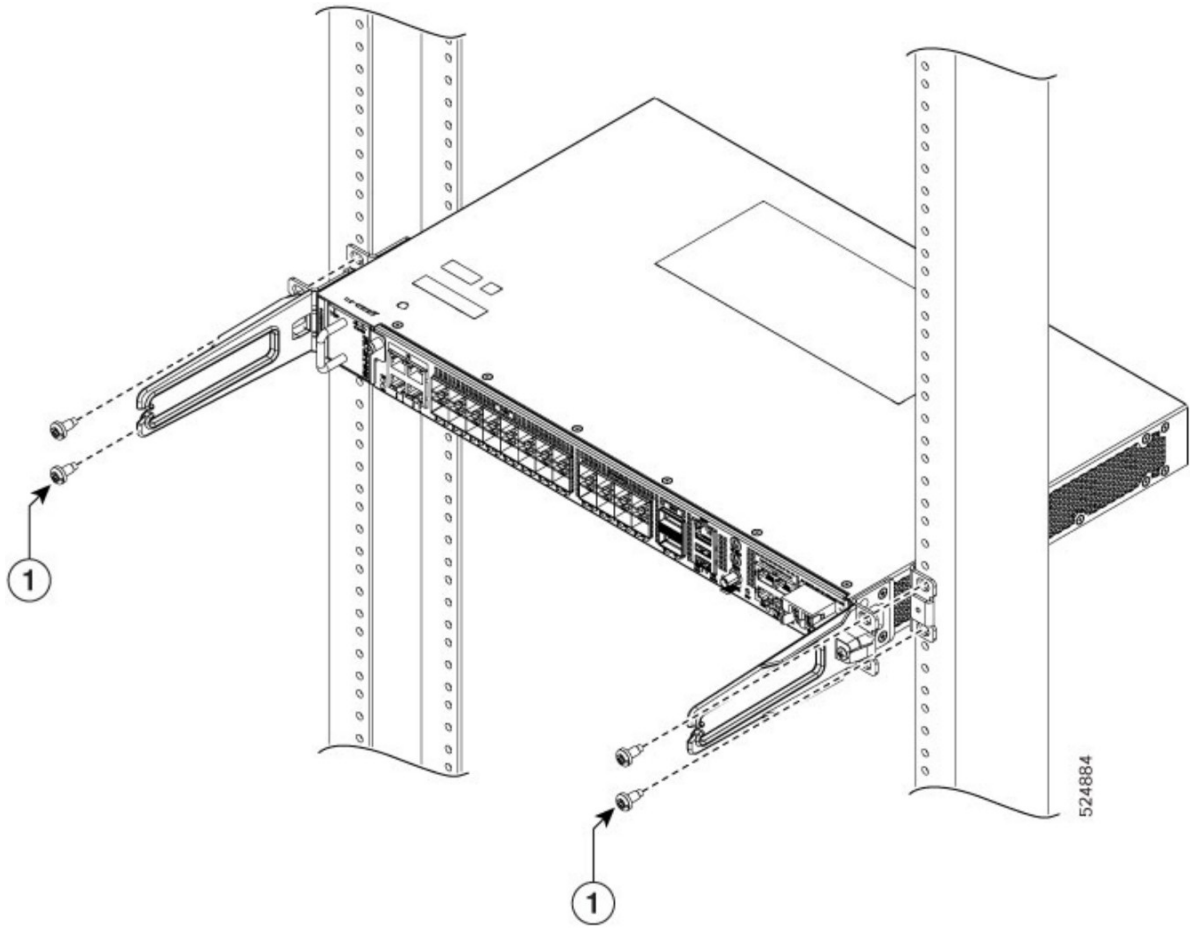


Table18:Requirementforinstallingrack-mountbracketsinthemiddleofatwopost19inchrack

SerialNo	PartNumber	Quantity
1	48-101690-01	4

Figure26:N540X-16Z4G8Q2C-A/Dchassiswith19inchrack-mountanglemountedatthefront

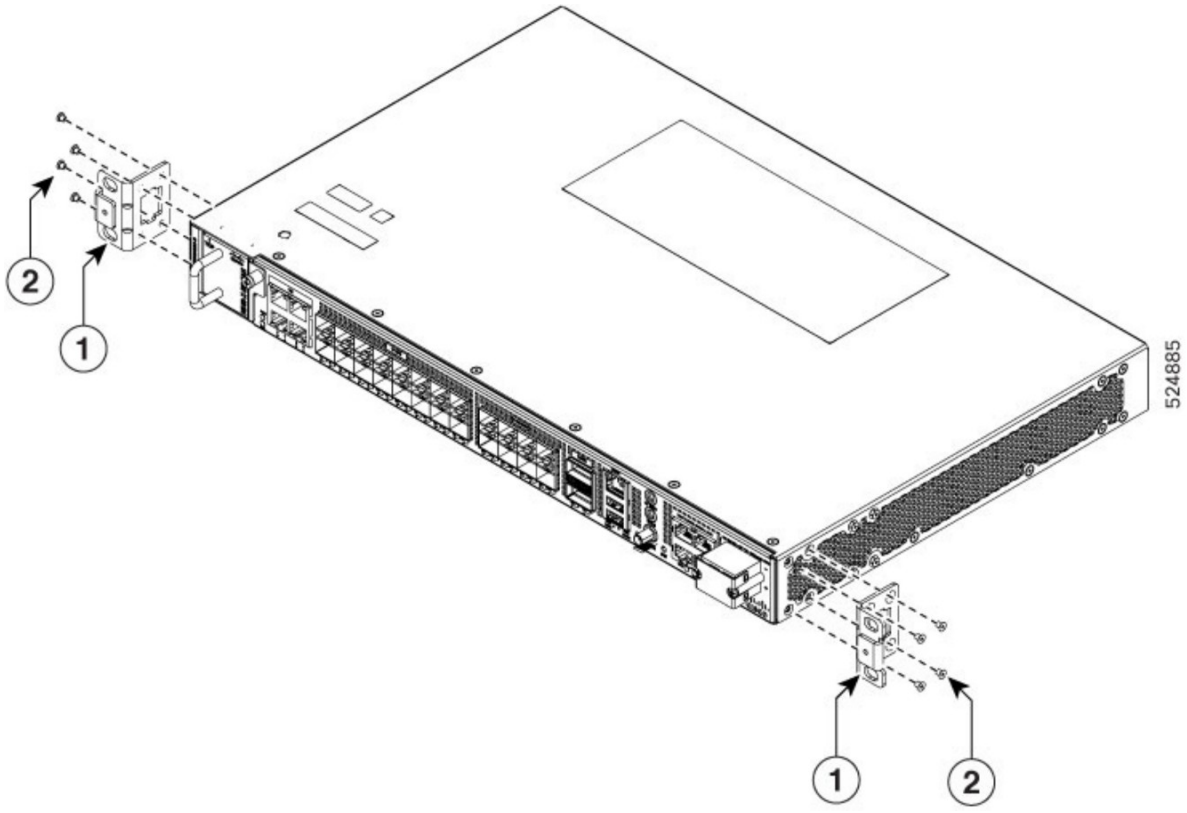


Table19:Requirementforinstallingrack-mountbracketsinthefront

SerialNo	PartNumber	Quantity
1	700-118409-01	2
2	48-1363-01	8

Figure27:N540X-16Z4G8Q2C-A/Dchassiswith19inchrack-mountanglemountedatthefrontinstalledontwopost19inchrack

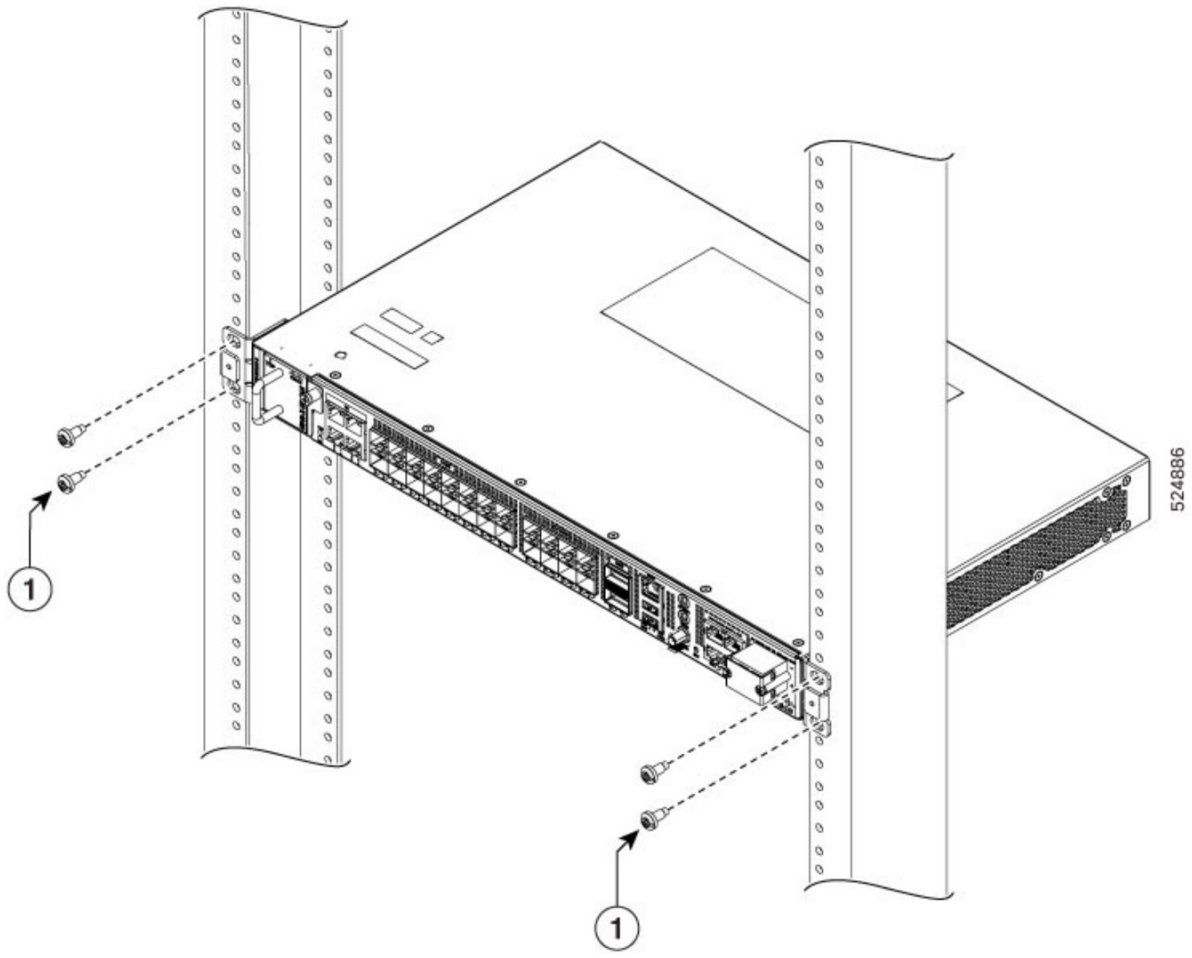


Table20:Requirementforinstallingrack-mountanglemountedatthefrontinstalledontwopost19inchrackmountbrackets

SerialNo	PartNumber	Quantity
1	48-101690-01	4

Figure28:N540X-16Z4G8Q2C-A/Dchassiswith19inchrack-mountbracketsmountedatthefrontwithcablemanagementbracketatthefront

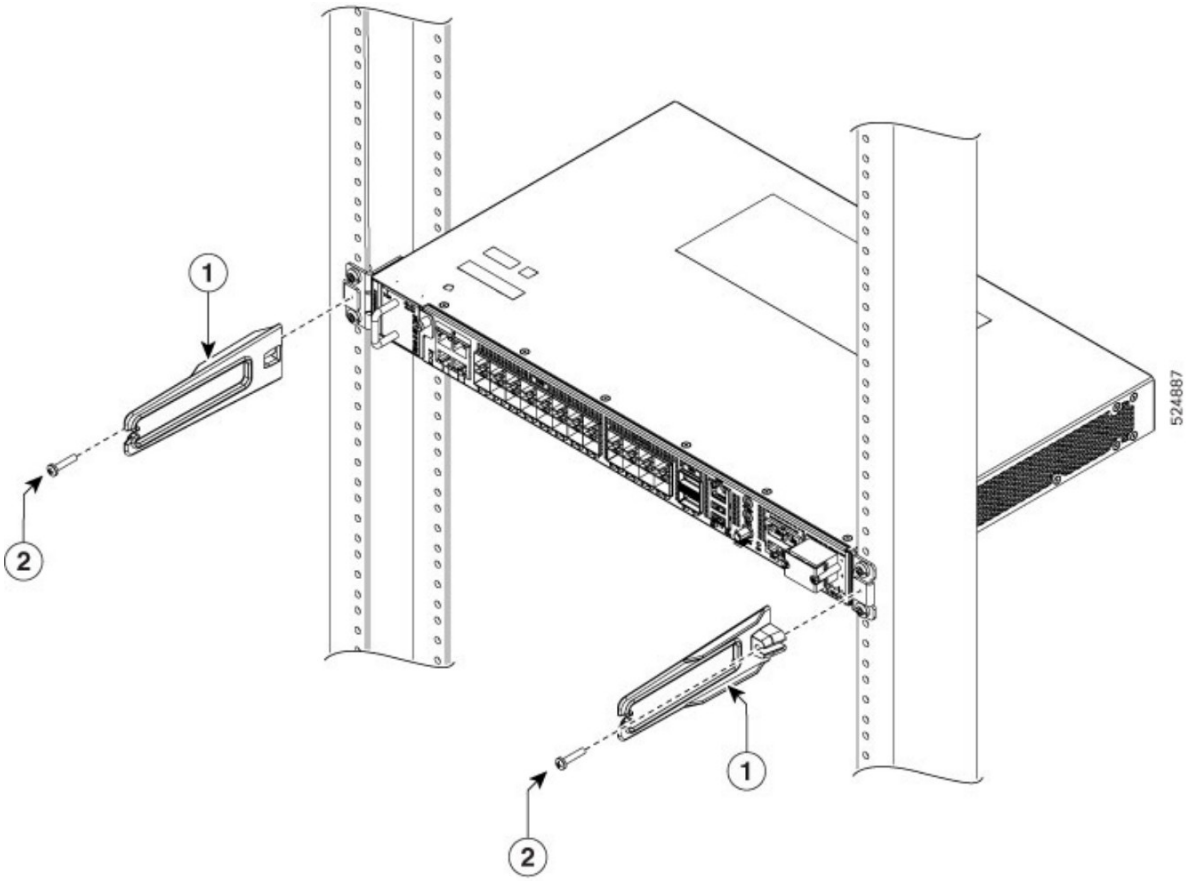


Table21:Requirementforinstallingrack-mountbracketsmountedatthefrontwithcablemanagementbracketatthefront

SerialNo	PartNumber	Quantity
1	700-05613-01	2
2	48-0654-01	2

Figure29:InstallingCableManagementand23inchRack-MountBracketsintheFront

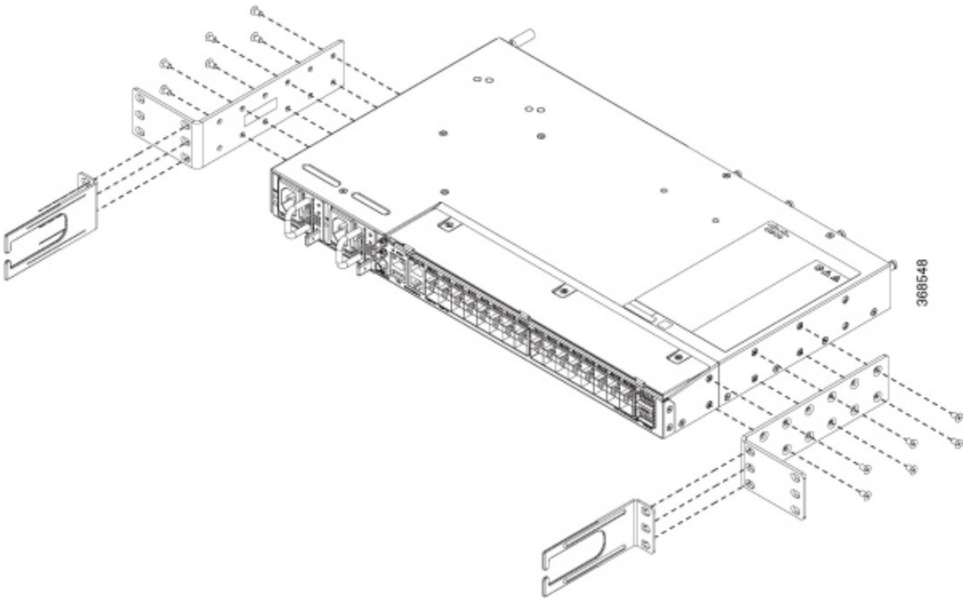


Figure30:InstallingCableManagementand23inchRack-MountBracketsintheMiddle

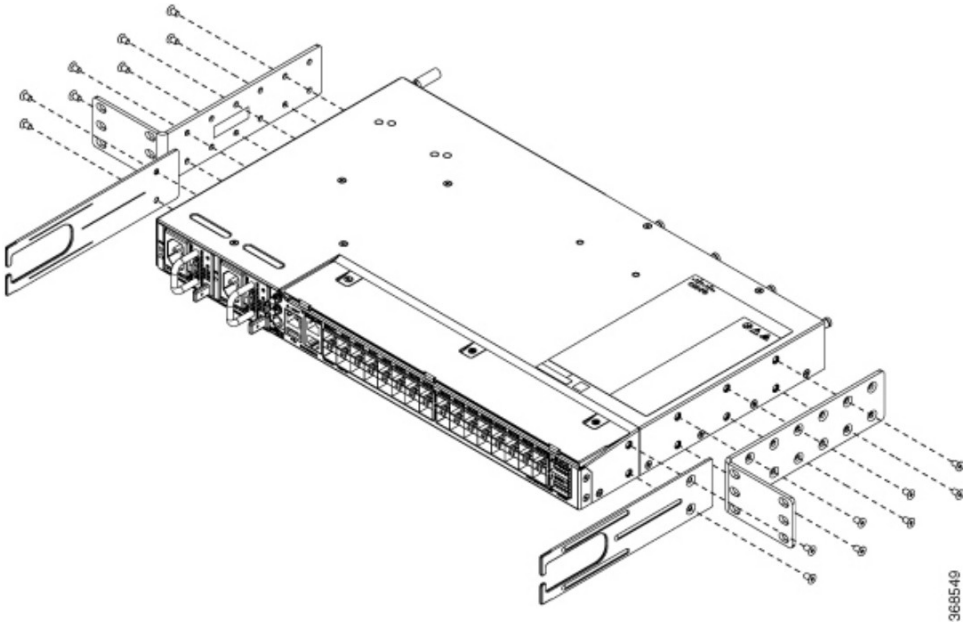
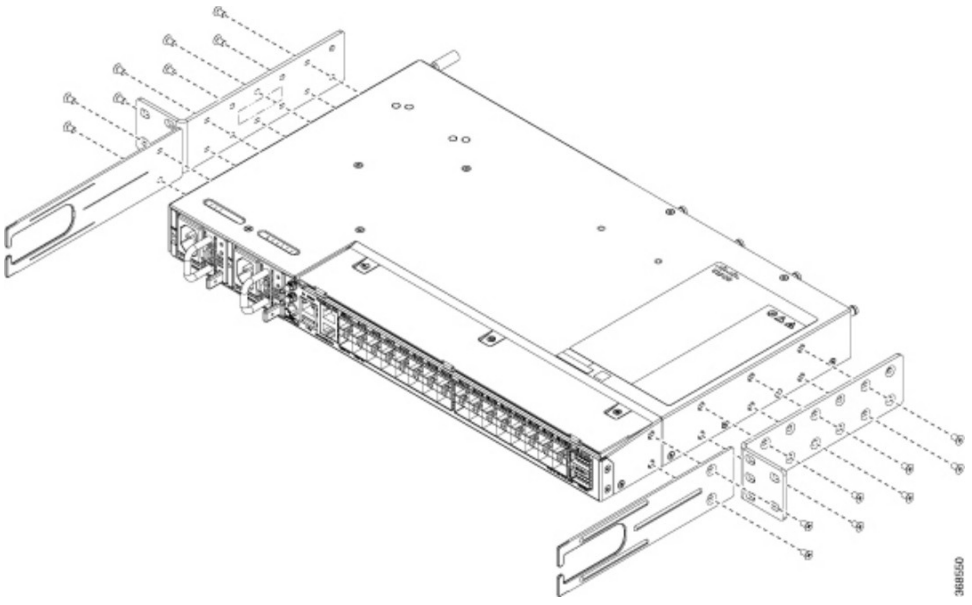


Figure31:InstallingCableManagementandETSIRack-MountBracketsintheMiddle



Step3 Installtherouterontothe2-postrackasfollows:

a) Liftandpositiontherouterintopositionbetweenthetworackposts.

b)Movetherouteruntiltherack-mountbracketscomeincontactwiththetworackposts.

c) Holdthechassisatlevelandhaveanotherwhilethesecondpersoninserttwoscrews(12-24or10-32,dependingon theracktype)ineachofthetworack-mountbrackets(usingatotaloffourscrews)andintothecagenutsorthreaded holesintheverticalrack-mountingrails.

d)Tightenthe10-32screwsto20in-lb(2.26N.m)ortightenthe12-24screwsto30in-lb(3.39N.m).

WallMount

Installthewallmountingbracketsandcableguidesontothechassisbeforeyoumountthechassis onthewall.

Note Thewallmountissupportedonlyon~~CiscoN540-24Z8Q2C-SYS,N540X-ACC-SYS,N540-ACC-~~N540-28Z4C-SYS-A/D,andN540-12Z20G-SYS-A/Drouters.

InstallWallBrackets

Thedeviceisshippedwithwallmountingbracketsthataretobesecuredonthesidesofthedevice.

Procedure

Step1 Removethewallmountingbracketsfromtheaccessorykitandpositionthembesidethedevice.

Note
Youcaninstallthebracketsasshowninthefigure.

Figure32:InstallWallMountBrackets(N540-28Z4C-SYS-D)

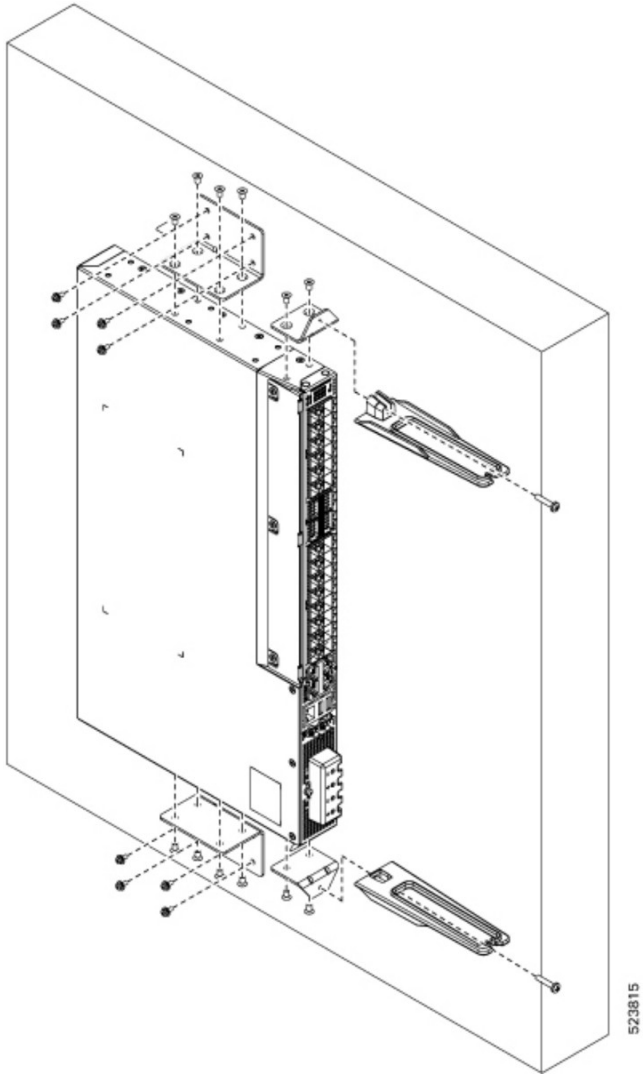
Step2 Securethebrackettothedevicewiththerecommendedmaximumtorqueof10inch-

WallMounttheDevice

Note Whileyoumountthedevice,alwaysensurethatthepowersuppliesareatthetoppositi

Forthesupportofthedeviceandcables,ensurethatthedeviceisattachedsecurelytowallstuds ortoafirmly attachedplywoodmountingbackboard.

Figure33:WallMounttheDevice(N540-28Z4C-SYS-D)



Caution Beforemountingthedevice,ensurethatallunusedholesatthesidesofthedevicearealwayspr screws.

InstallingtheAirFilter

Thissectiondescribesinstallingtheairfilter,N540X-16Z4G8Q2C-F,onthefollowingNCS540router variants:

- N540X-16Z4G8Q2C-A
- N540X-16Z4G8Q2C-D

Note Themaximumoperatingtemperatureis60°Cwhenairfiltersanddustcoversareinstalledont

Themaximumoperatingtemperatureincreasesto70°Cwhenairfiltersanddustcoversarere movedfromthe system.

Note Theairfiltersareforone-monthsandreplaceiteverysixmonthsifneeded.

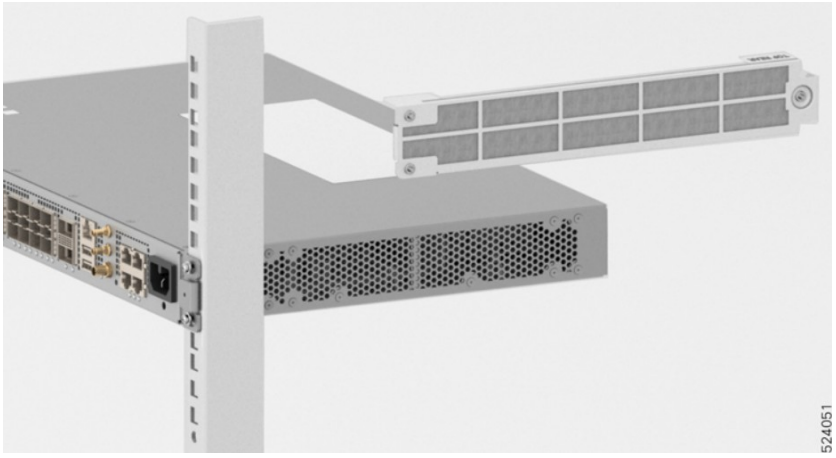
Beforeyoubegin

- Completethe"Rack-Mount,onpage40"procedure.
- Sincetheairfilterisinstalledfromthetop,makesurethatthereisapproximately2rackuni tsofspace abovetherouter.

Procedure

Step1 Positiontheairfilterontopoftheairinletsideofthechassisasshowninthefigure.

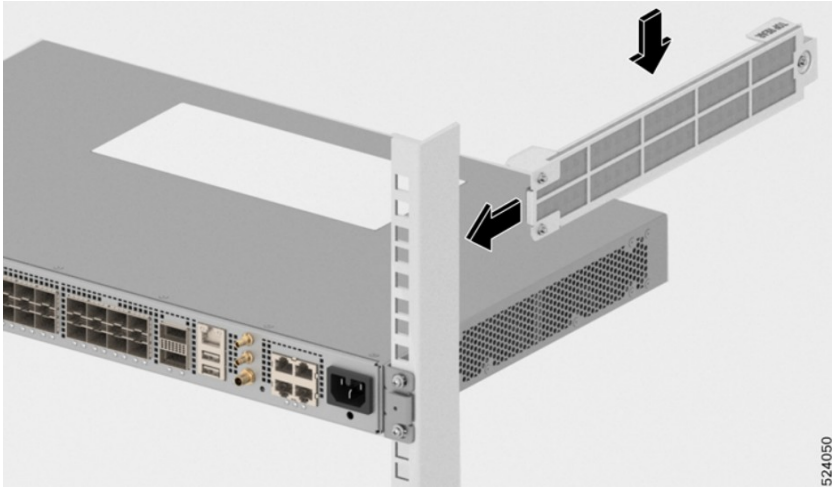
Figure34:Positiontheairfilter



Note
Locatethelabel"TOPREAR"ontheairfilter'stopbracket.Thelabelservesasaninstallationguideindicating thatthis sideoftheairfiltershouldbepositionedatthetopoftherouterchassis.

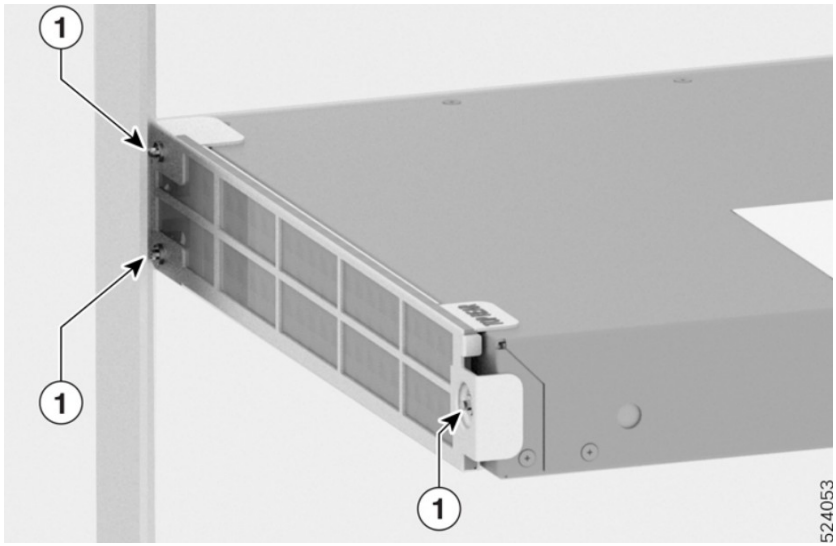
Step2 Fromthetop,slidetheairfiltertocovertheairventsasshowninthefigure.

Figure35:Slidetheairfilter



Note
Therearethreemagneticpointsontheairfilterasshowninthefigure.Themagneticpointskeeptheairfiltersecuredto therouterchassis.

Figure36:Magneticpoints



Installtheairfilter(N540-FR-KIT-EG)(frontandsideviews)

Thissectiondescribesinstallingtheairfilter,N540-FR-KIT-EG,onthefollowingNCS540routervariants:

- N540X-16Z4G8Q2C-A
- N540X-16Z4G8Q2C-D

Note Theairfiltersareforone-monthsandreplaceiteverysixmonthsifneeded.

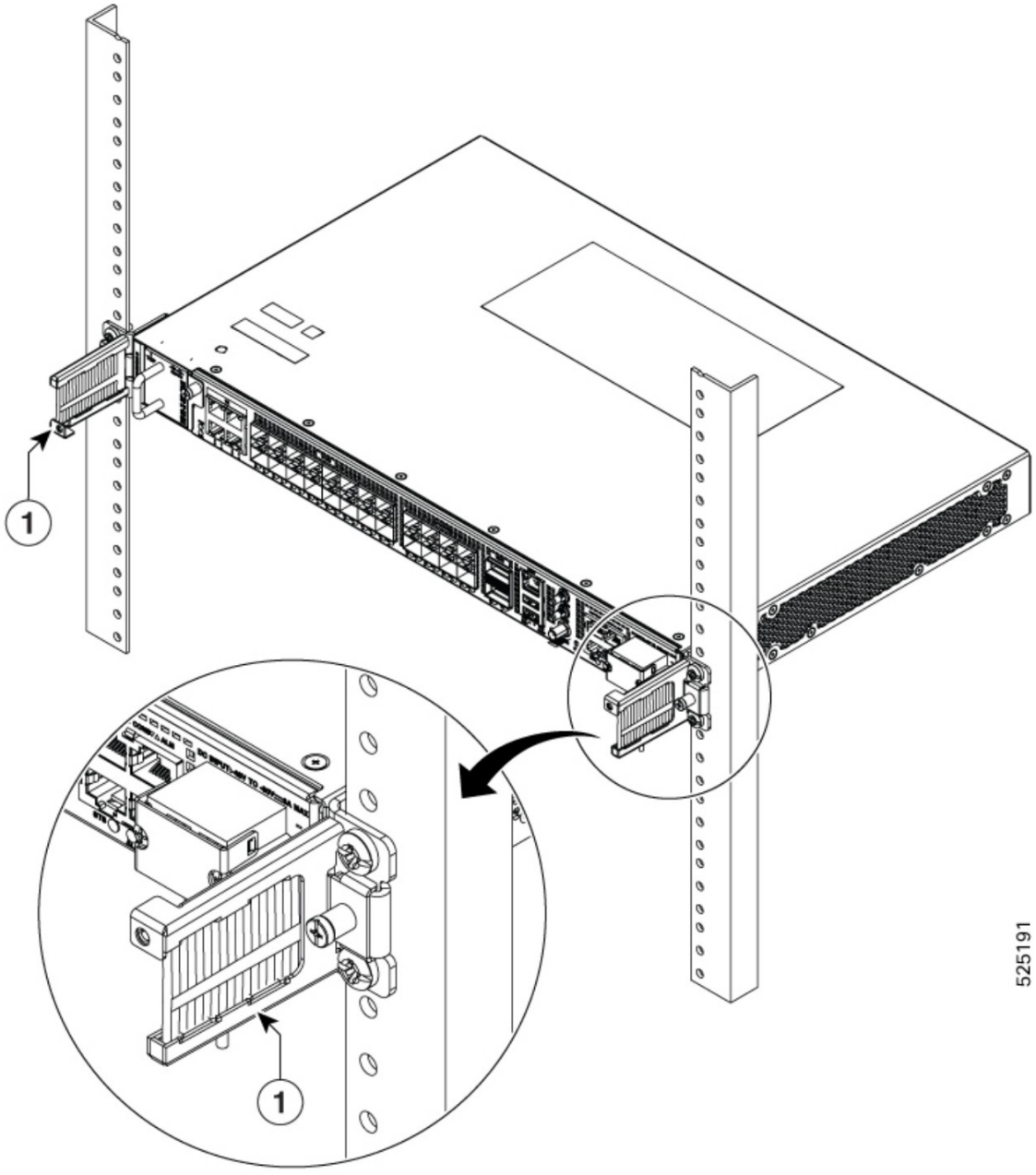
Beforeyoubegin

- Completethe"Rack-Mount,onpage40"procedure.
- Sincetheairfilterisinstalledfromthetop,makesurethatthereisapproximately2rackunitsofspace abovetherouter.

Procedure

Step1 Mountthecablemanagementontothemountingearsonbothsides.

Figure37:Mountthecablemanagement

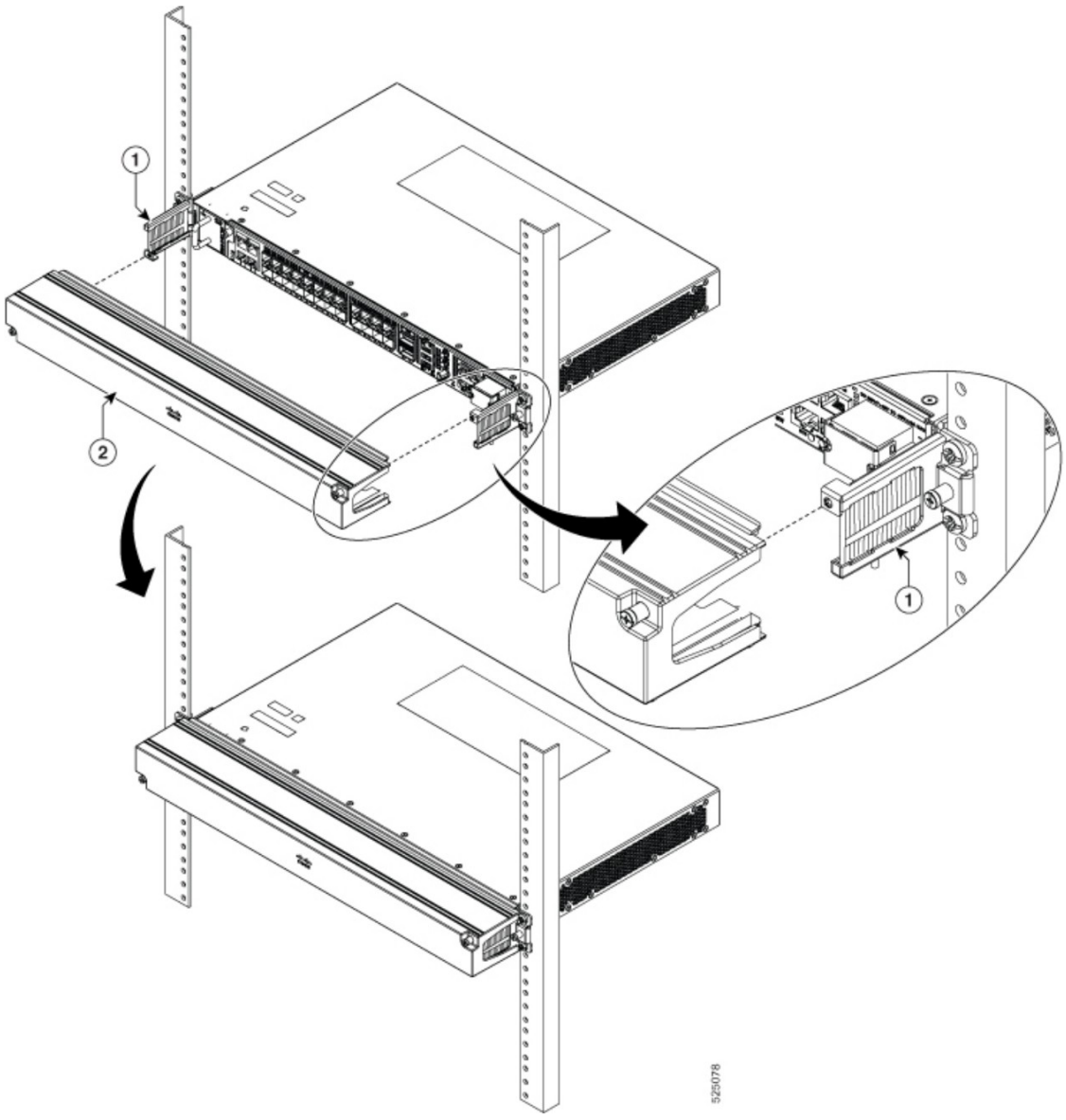


Part	PartNumbe	Quanti
1-Cable management	800-52079-01	2

Note
Usethumbscrewtofixcablemanagementwithrackmountbracket.

Step2 Assemblethefrontairfiltercover.

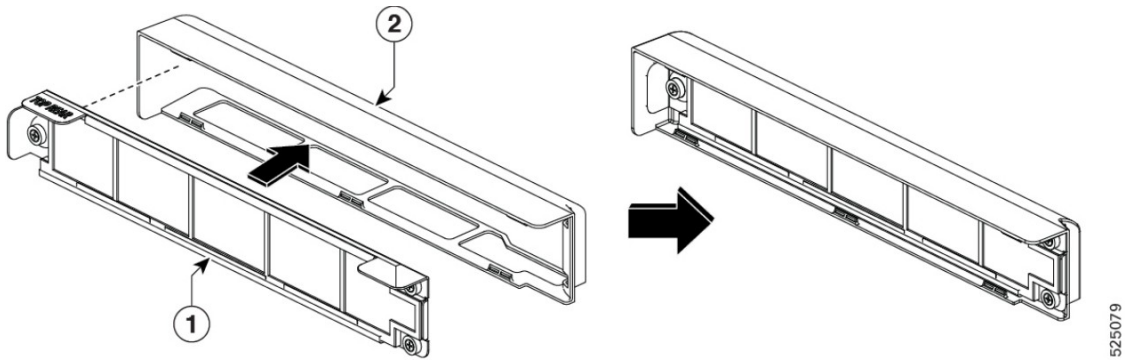
Figure38:Frontairfilter



Part	PartNumbe	Quanti
1-Cablemanagement	800-52079-01	2
2-Airfilterfront cover	700-137145-01	1

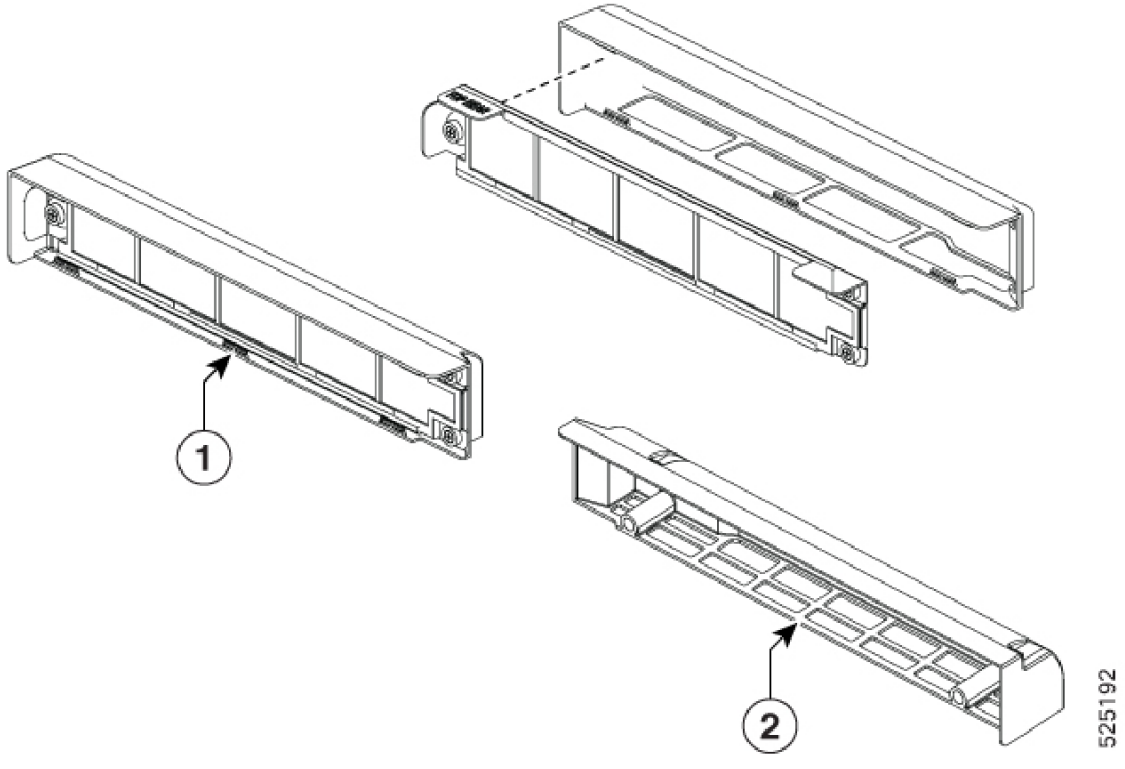
Step3 Fixtheside-mountedairfilterontotheairbaffle(RH).

Figure39:Side-mountedairfilter



Part	PartNumbe	Quanti
1-Airfilter	800-112483-02	1
2-Air baffle	700-137173-01	1

Figure40:Airfilter



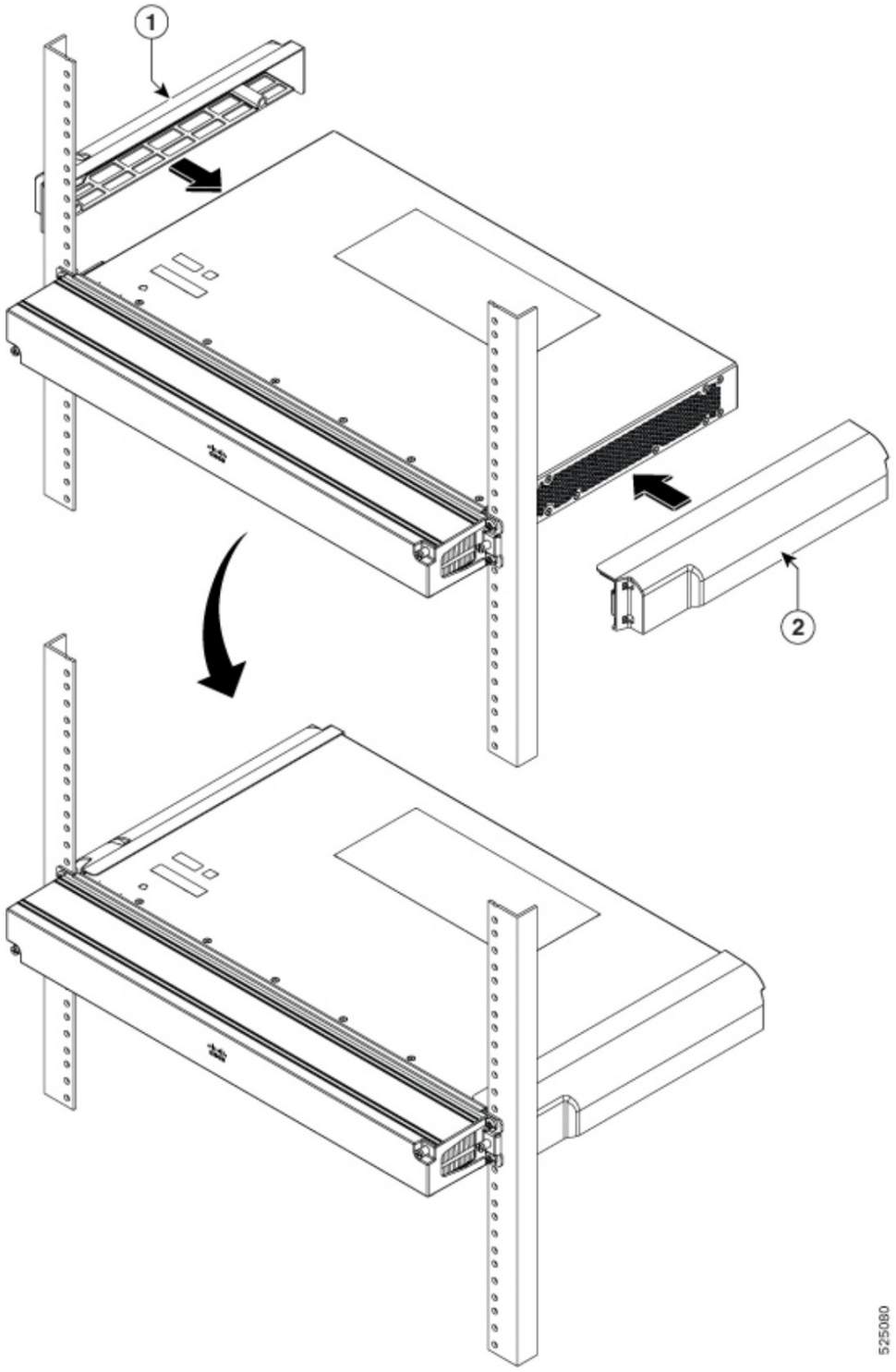
Part	PartNumbe	Quanti
1-Airbaffle-Rightsidewithairfilter	700-137173-01 800-	1

Part	PartNumber	Quantity
2-Airbaffleleftside	700-137549-01	1

Warning
Airfilterbafflewithairfiltershouldbeassembledinrightsideofthechassisairinlet.

Step4 Mountboththerightandleftairbafflesonthechassis.

Figure41:Mountingairfiltersonbothsidesofchassis



Part	PartNumbe	Quanti
ExhaustBaffle-1	700-137549-01	1

Part	PartNumbe	Quanti
Rightsideairbafflewithfilter - 2	700-137173-01 800-	1

Warning
Werecommendthatyouuseonlythescrewswithpartnumber48-101690-01tomountthechassisonrack.Otherscrews arenotrecommendedforthesidefilterassembly.

Warning
Theportswithoutopticsshouldbeclosedwithdustcaps.

Installtheairfilter(N540-FR-KT-EG-200)(frontandsideviews)

Thissectiondescribesinstallingtheairfilter,N540-FR-KT-EG-200,onthefollowingNCS540routervariants:

- N540X-16Z4G8Q2C-A
- N540X-16Z4G8Q2C-D

Note Theairfiltersareforone-monthsandreplaceiteverysixmonthsifneeded.

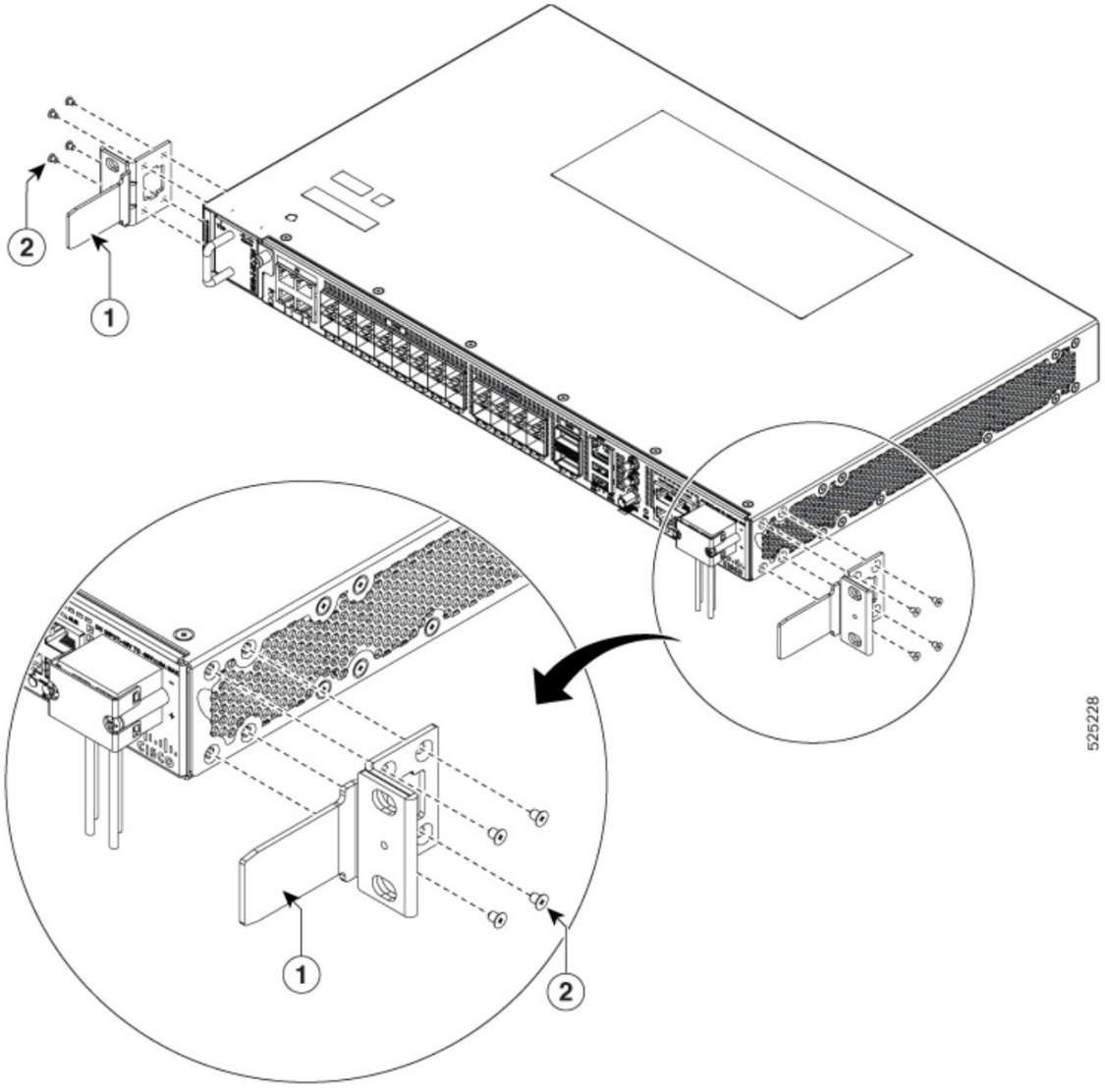
Beforeyoubegin

- Completethe"Rack-Mount,onpage40"procedure.
- Sincetheairfilterisinstalledfromthetop,makesurethatthereisapproximately2rackunitsofspace abovetherouter.

Procedure

Step1 Fixmountingearsonbothsidesofthechassisandfastenwithscrews.

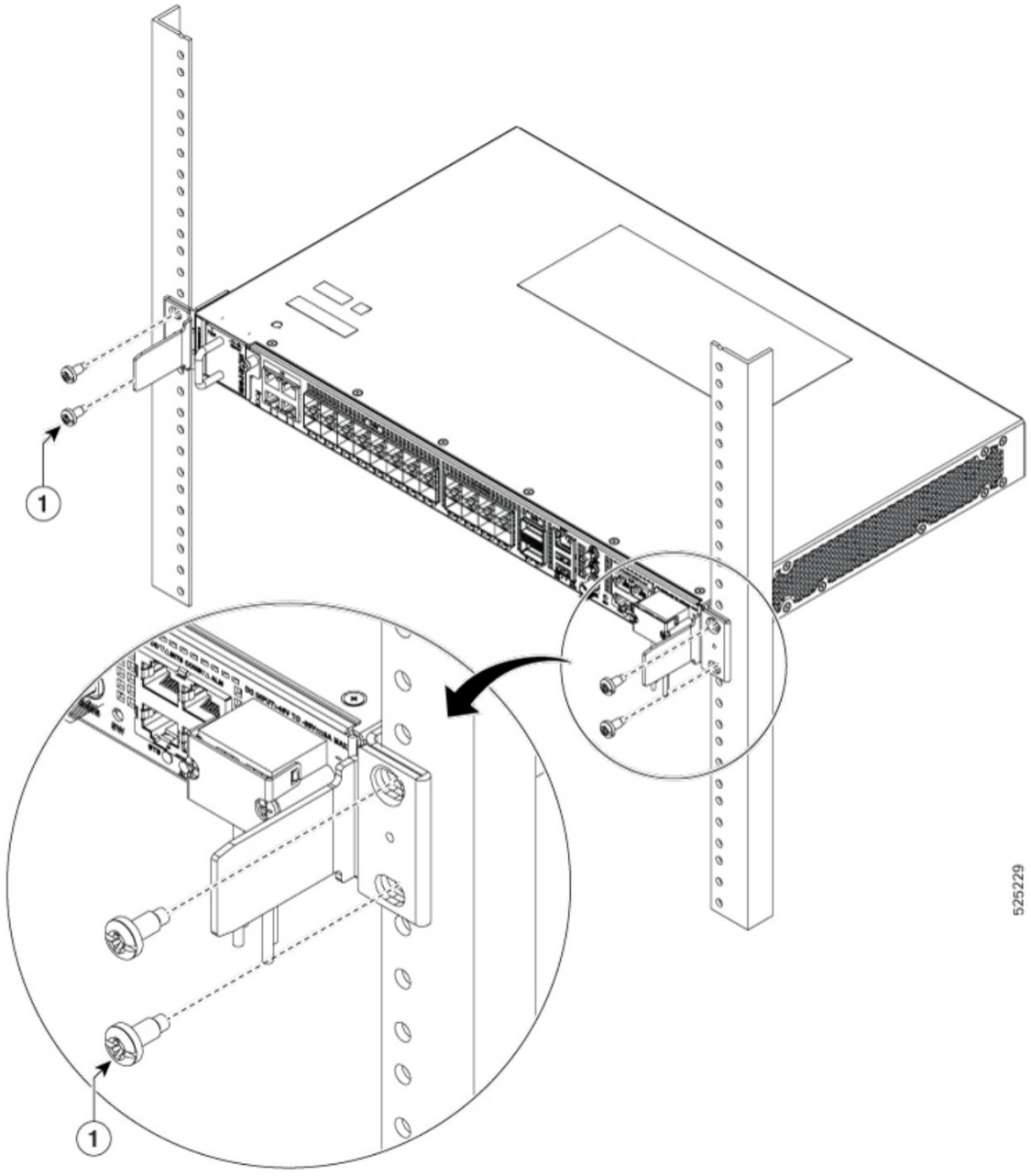
Figure42:Fixmountingearsonchassis



Par	PartNumbe	Quanti
1	700-138377-01	2
2	48-1363-1	8

Step2 MountN540X-16Z4G8Q2C-A/Dchassiswith19-inchrack-mountangleatthefrontontwopost19-inchrack.

Figure43:N540X-16Z4G8Q2C-A/Dchassiswith19-inchrack-mountanglemountedatthefrontinstalledontwopost19-inchrack

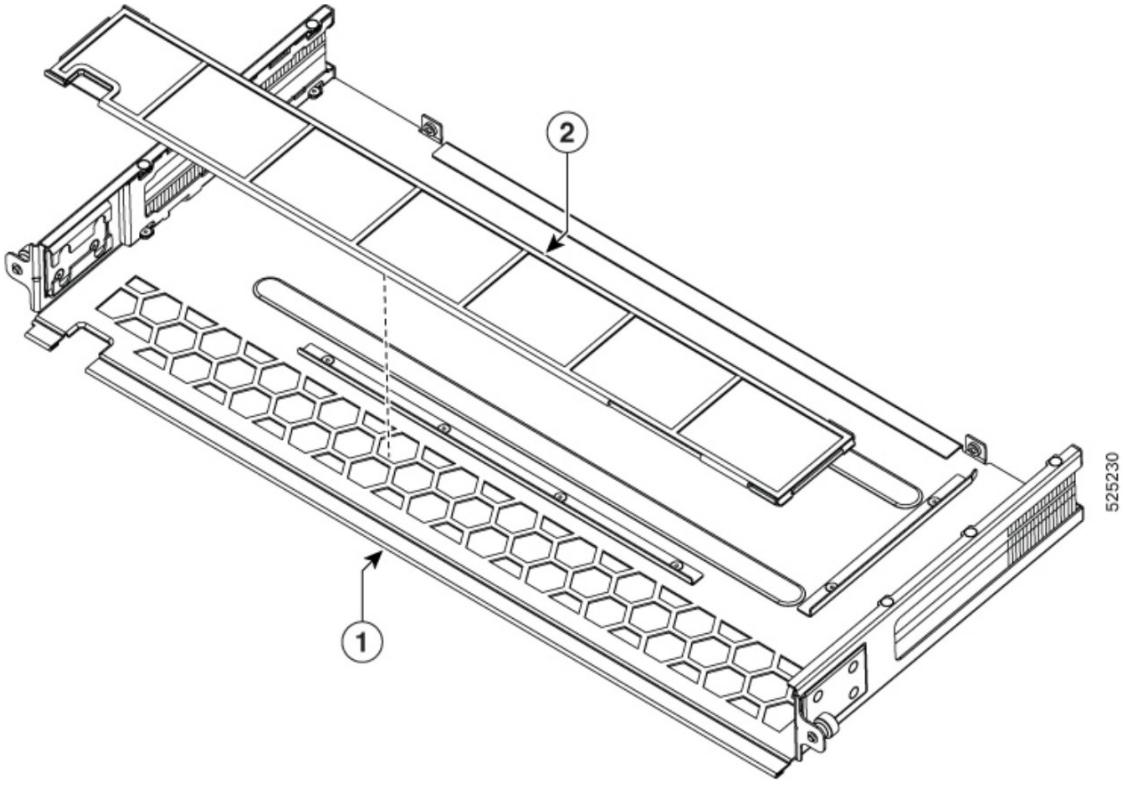


Requirementforinstallingrack-mountanglemountedatthefrontinstalledontwopost19-inchrackmountbrackets

Part	PartNumber	Quantity
1	48-101690-01	4

Step3 Assembletheairfilterontheventareaofairfiltertray.

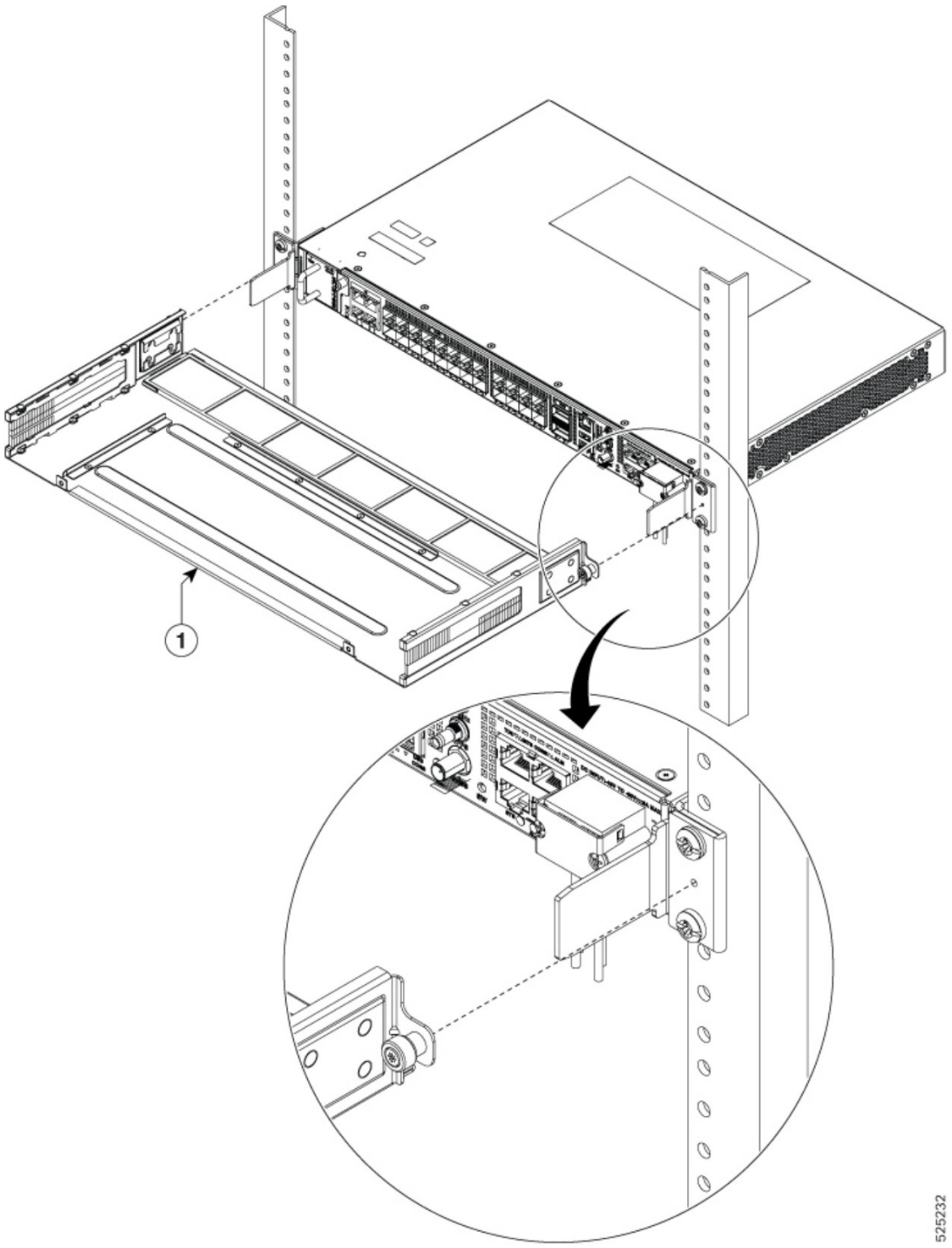
Figure44:Airfilterwithtray



Part	PartNumbe	Quanti
1-Air tray	800-52147-01	1
2-Air filter	800-52113-01	1

Step4 Mounttheairfilterontherackmountguideandtightenwithcaptivescrewonthetray.

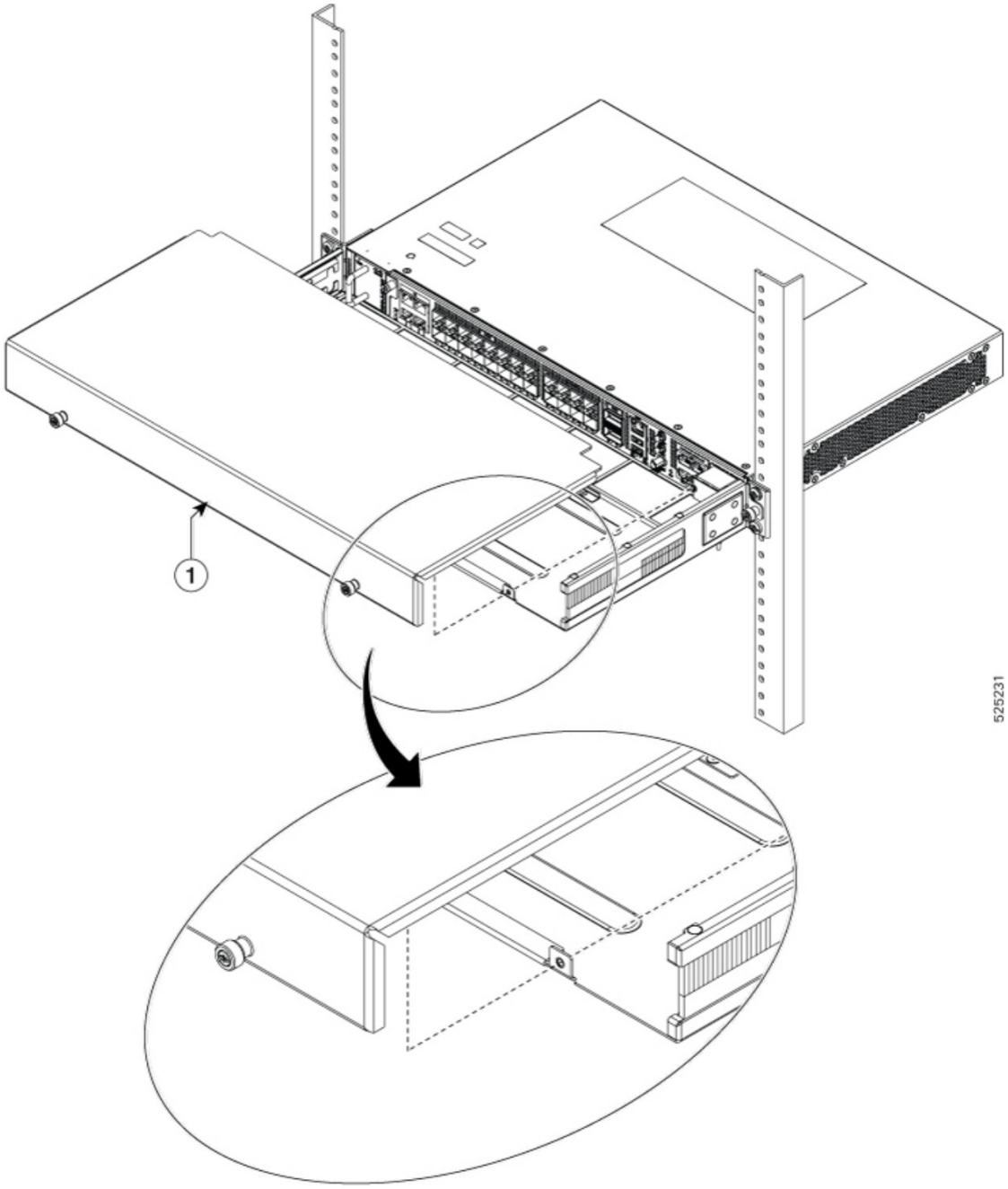
Figure45:Mountingairfiltersonrackandbothsidesofchassis



Part	PartNumbe	Quanti
1-Air tray	800-52147-01	1

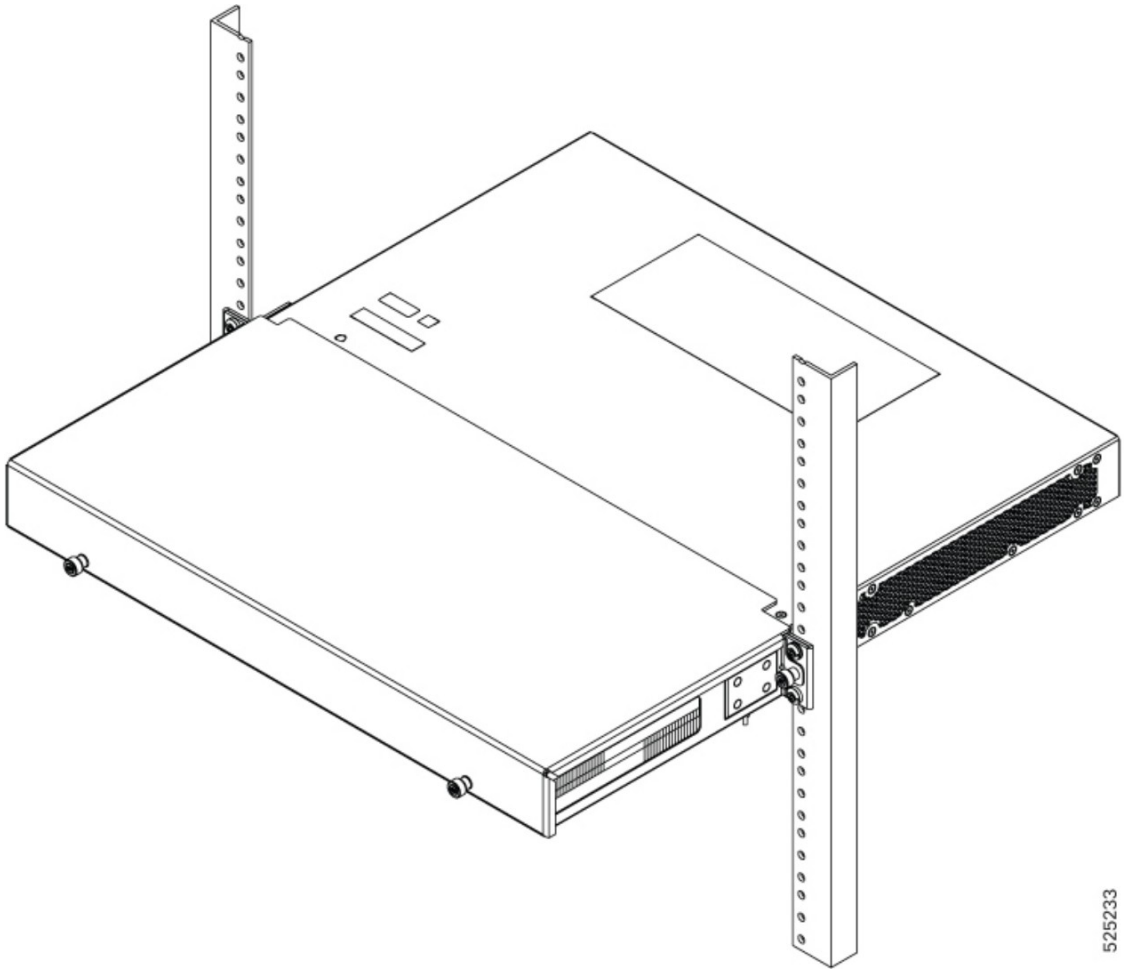
Step5 Mounttheairfiltercoverontopofthetrayandfastenwithcaptivescrewafterfixingalltheoptics.

Figure46:Airfiltercovermounteronairfiltertray



Part	PartNumber	Quantity
1-Airfilter cover	700-138383-01	1

Figure47:Airfilterinstalledonchassis



Warning
Werecommendthatyouuseonlythescrewswithpartnumber48-101690-01tomountthechassisonrack.Otherscrews arenotrecommendedforthesidefilterassembly.

Warning
Theportswithoutopticsshouldbeclosedwithdustcaps.

GroundtheDevice

Beforeyoubeginthistask,ensurethatyouhavereadandunderstoodthesafetywarningsinthePreventing ESDDamagesectionofthe*SafetyWarnings*handouttopic.

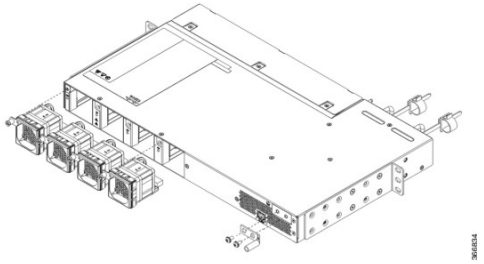
Beforeyouconnectthepowerorturnonthepowertothedevice,youmustprovideanadequatedeviceground (earth)connectiontoyourdevice.

Thissectiondescribeshowtogroundthedevice.Thegroundinglugislocationisonthebackpanelofthedevice.

Procedure

Step1 Verifythatthegroundcableisconnectedtothetopoftherackandaccordingtolocalsitepractice.

Figure48:GroundLug



Step2

Attachoneendoftheshelfgroundcable(#6AWGcable)tothegroundpointontherearofthechassisusingthespecified

dual-holelugconnector.

a) Useawire-strippingtooltoremoveapproximately0.75inches(19mm)ofthecoveringfromtheendofthegrounding cable.

b)Insertthestrippedendofthegroundingcableintotheopenendofthegroundinglug.

c) Usethecrimpingtooltosecurethegroundingcableinthegroundinglug.

d)Removetheadhesivelabelfromthegroundingpadonthechassis.

e) Placethegroundinglugagainstthegroundingpadsothatthereissolidmetal-to-metalcontact,andinsertthetwo

M4screwswithwashersthroughtheholesinthegroundinglugandintothegroundingpad.

f) Ensurethatthelugandcabledonotinterferewithotherequipment.

g)Preparetheotherendofthegroundingcableandconnectittoanappropriategroundingpointinyoursitetoensure adequateearthground.

InstalltheACPowerCables

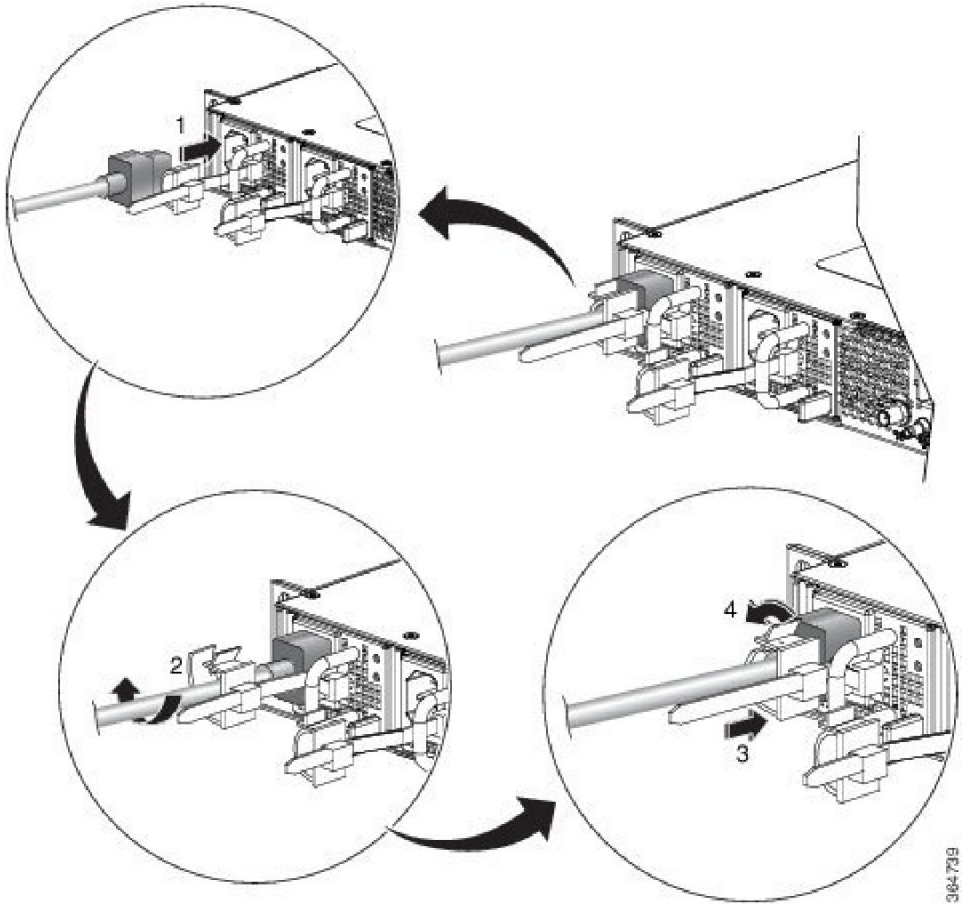
ToinstalltheACpowercablesinthepowersupplyslots:

Procedure

Step1 Plugthepowersupplycordinthepowersupplymodule.

Step2 Insertthepowersupplycordintothetie[1,3]andtightenthetiearoundthepowersupplycordasshownin figurebelow.

Figure49:AttachtheACPowerTie-and-ClipCord



Note
Theseimagesareforonlyrepresentationpurposes.CertainvariantsofCiscoNCS540donotincludeatie forthepower supplycord.

ActivateanACPowerSupplyModule

PerformthefollowingproceduretoactivateanACpowersupply:

Procedure

Step1 Plugthepowercordintothepowersupply.
Step2 Connecttheotherendofthepowercordtoan AC-inputpowersource.
Step3 Verifypowersupplyoperationbycheckingiftherespectivepowersupplyfrontpanel LED(PM0orPM1
Step4)isgreen.
Step5 IftheLEDsindicateapowerproblem,see*Troubleshooting*fortroubleshootinginformation.

Note
Ifyouareconnectingaredundant ACpowersupply,ensurethateachpowersupplyisconnectedtoase paratepower sourceinordertopreventpowerlossintheeventofapowerfailure.

InstalltheDCPowerCables

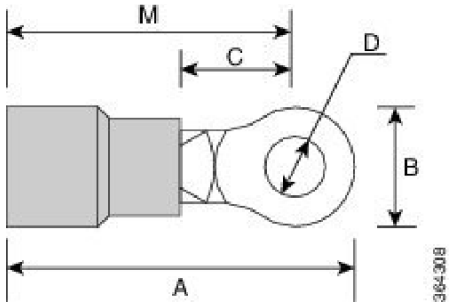
Note WheninstallingDCpowersupply,use12AWG,90°Ctemperatureratedcable.Therecommen is3metersmaximumfromsource.Upto5metersuse10AWG,andupto3metersuse12A WG,90°C temperatureratedcableandforotherlengthcontactCisco.

Note ForN540X-16Z4G8Q2C-A/DandN540X-16Z8Q2C-
90°Ctemperatureratedcable.Therecommendedcablelengthis3metersmaximumfromso urce.Upto5
metersuse14AWG,andupto3metersuse16AWG,90°Ctemperatureratedcableandforothe rlengthcontact Cisco.

Note
- Alwaysensurethatthebuilding’sinstallationforshort-
  15A.
- WerecommendedusingaCircuitbreakerorafastactingfusewithamaximumDCrating of10Afor overcurrentprotection.

Note TheDCconnectororterminalblockhasaninbuiltscrewandcagenuttowhichtorqueof1.3to1. beapplied.

Figure50:DCConnectorwithInbuiltScrew



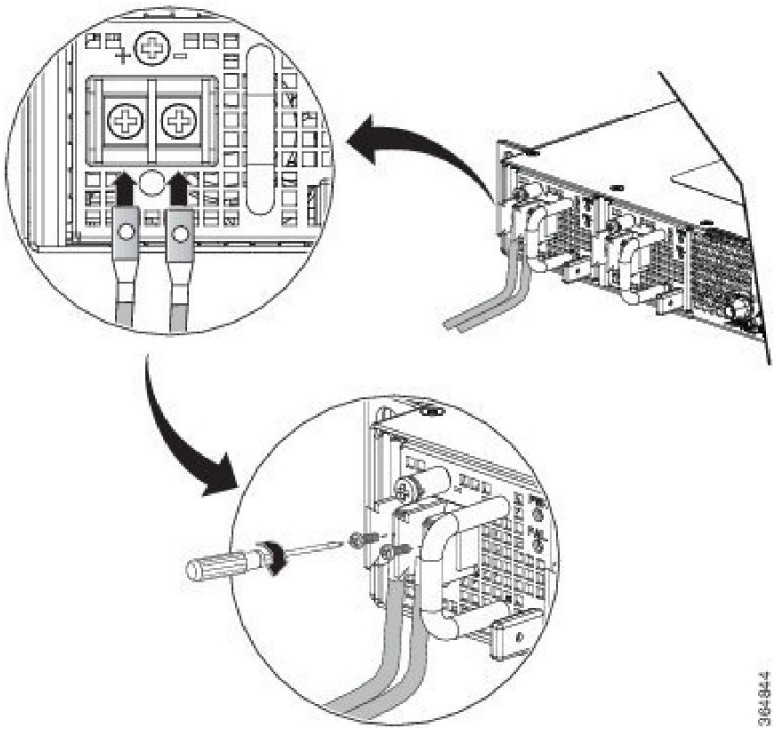
A	0.74in.(1.88 cm)	C	0.18in. (0.46cm)
B	0.25in.(0.64 cm)	D	0.14in. (0.36cm)
M	0.62in.(1.58 cm)		

ToattachtheDCpowersupplies:

Procedure

Step1 Locatetheterminalblockplug.
Step2 InserttheDC-inputpowersourcewiresintotheterminalblockplug.
Step3 AttachtheDCsupplywiresusingthedesignatedscrews.
Step4 Usearatchetingtorquescrewdrivertotorquetheterminalblockplugcaptivescrew.Seethefollo

Figure51:AttachtheDCPowerSupplyWires



Note
Theseimagesareforonlyrepresentationpurposes.CertainvariantsofCiscoNCS540mayvary.

ActivateaDCPowerSupplyModule

PerformthefollowingproceduretoactivateaDCpowersupply:

Procedure

Step1 Removethetapefromthecircuit-breakerrouterhandle,andrestorepowerbymovingthecircuit-totheOn(|)position.

Step2 Verifythepowersupplyoperationbycheckingwhethertherespectivepowersupplyfrontpanel LED(PM0orPM1)is green.

Step3 IftheLEDsindicateanyissueswithpowerproblem,see*Troubleshooting*.

Step4 IfyouarealsoconnectingaredundantDCpowersupply,repeatthesestepsforthesecondpowersource.

Note
IfyouareconnectingaredundantDCpowersupply,ensurethateachpowersupplyisconnectedtoas eparatepower sourceinordertopreventpowerlossintheeventofapowerfailure.

PortConnectionGuidelines

Dependingonthechassis,youcanuseQuadSmallForm-FactorPluggablePlus(QSFP+),QSFP28,SFP, SFP+,andRJ45connectorstoconnecttheportsonthelinecardstoothernetworkdevices.

Topreventdamagetothefiber-opticcables,werecommendthatyoukeepthetransceiversdisconnectedfrom theirfiber-opticcableswheninstallingthetransceiverinthelinecard.Beforeremovingatransceiverfro m therouter,removethecablefromthetransceiver.

Tomaximizetheeffectivenessandlifeofyourtransceiversandopticalcables,dothefollowing:

- WearanESD-preventativewriststrapthatisconnectedtoanearthgroundwheneverhandlingtranscei vers. TherouteristypicallygroundedduringinstallationandprovidesanESDporttowhichyou canconnect yourwriststrap.
- Donotremoveandinsertatransceivermoreoftenthanisnecessary.Repeatedremovalsa ndinsertions canshortenitsusefullife.
- Keepthetransceiversandfiber-opticcablescleananddustfreetomaintainhighsignalaccuracyandto preventdamagetotheconnectors.Attenuation(lossoflight)isincreasedbycontaminati onandshould bekeptbelow0.35dB.
  - Cleanthesepartsbeforeinstallationtopreventdustfromscratchingthefiber-opticcableends.
  - Cleantheconnectorsregularly;therequiredfrequencyforcleaningdependsuponth eenvironment. Inaddition,cleanconnectorswhentheyareexposedtodustoraccidentallytouched. Bothwetand drycleaningtechniquescanbeeffective;refertoyoursite'sfiber-opticconnectioncleaning procedures.
  - Donottouchtheendsofconnectors.Touchingtheendscanleavefingerprintsandc auseother contamination.
- Inspectroutinelyfordustanddamage.Ifyoususpectdamage,cleanandtheninspectfibe rendsundera microscopetodetermineifdamagehasoccurred.

ConnecttotheConsolePort

Beforeyoucreateanetworkmanagementconnectionfortherouterorconnecttheroutertoth enetwork,you mustcreatealocalmanagementconnectionthroughaconsoleterminalandconfigureanIPa ddressforthe router.Youalsocanusetheconsoletoperformthefollowingfunctions(eachofwhichcanbeper formed throughthemanagementinterfaceafteryoumakethatconnection):

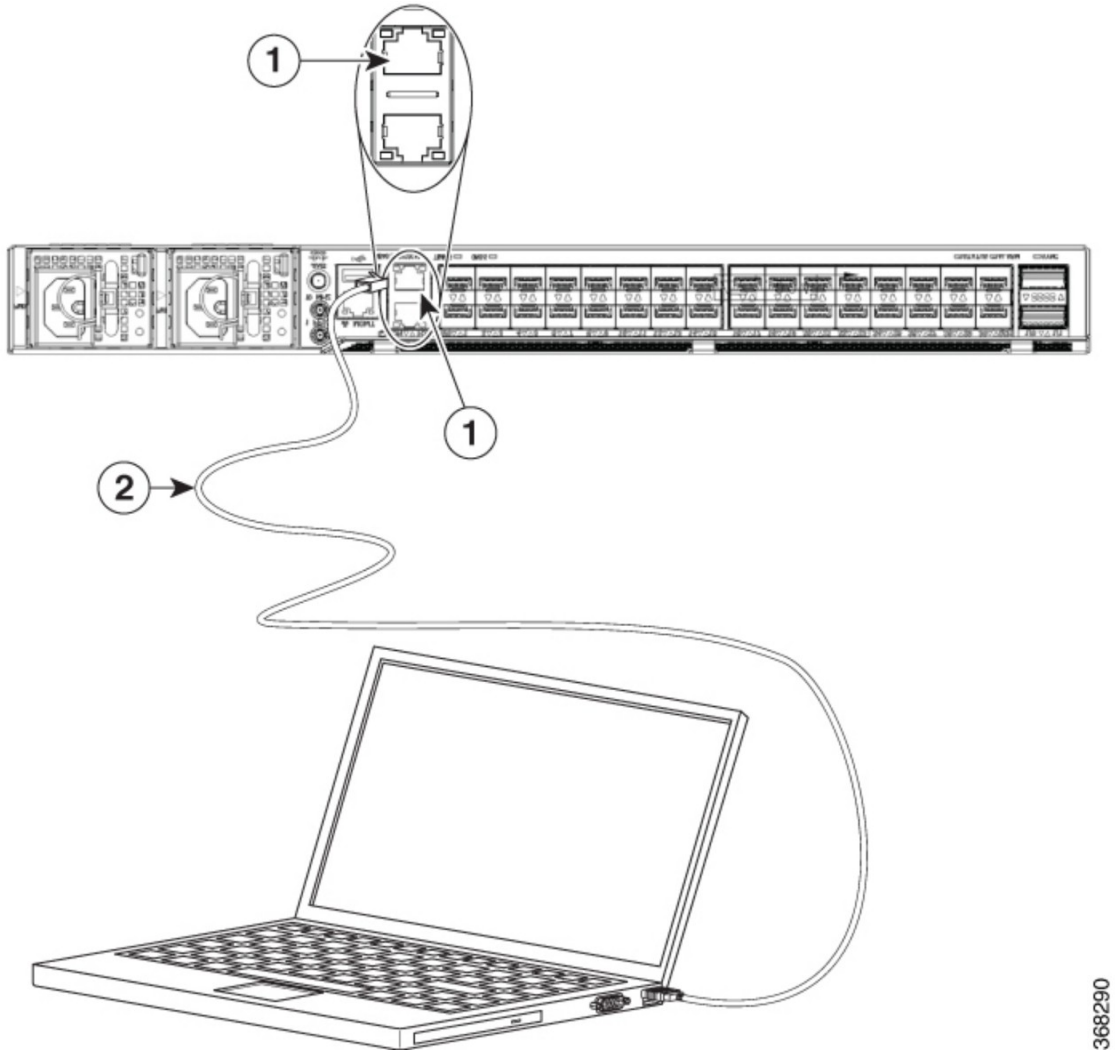
- Configuretherouterusingthecommand-lineinterface(CLI).
- Monitornetworkstatisticsanderrors.
- ConfigureSimpleNetworkManagementProtocol(SNMP)agentparameters.
- Downloadsoftwareupdates.

ThesystemconsoleportisanRJ-45receptacleforconnectingadataterminaltoperformtheinitialconfiguration ofCiscoNCS540fixed-portchassis.Theconsolecableisshippedwiththehardware.

Note OnlyRJ45toDB-9adaptercableisprovidedinthepackage.

Caution Werecommendyoutosettheterminaltotheseoperationalvalues:115200bps,8databits,no bitsandflowcontrolasnone.Settinganyflowcontrol,maycausecongestionintheconsolebu fferleading tounexpectedbehavior.

Figure52:ConnectingtheUSBConsoleCabletotheChassis



1	RJ45Port	2	USBType-Aconsolecable

Followthisproceduretoconnectadataterminaltotheconsoleport.

Beforeyoubegin

- Theroutermustbefullyinstalledinitsrack,connectedtoapowersource,andgrounded.
- Thenecessarycablingfortheconsole,management,andnetworkconnectionsmustbeavailable.
  - AnRJ-45rollovercableandDB9F/RJ-45adapterareprovidedintherouteraccessorykit.
  - NetworkcablingshouldalreadyberoutedtothelocationoftheinstalledrouterProcedure

Step1 Setyourterminaltotheseoperationalvalues:115200bps,8databits,noparity,and2stopbitsandflowc Settinganyflowcontrol,maycausecongestionintheconsolebufferleadingtounexpectedbehavior.

Step2 Attachtheterminalendofthecabletotheinterfaceportonthedataterminal.

Step3 Attachtheotherendofthecabletotheconsoleport.

FollowingtablerepresentstheRJ-45cablepin-outinformation.

Table22:RJ-45Straight-throughCablePin-outs

RJ-45Pin	Signal
1	—
2	—
3	Tx
4	Ground(GND)
5	GND
6	Rx
7	—
8	—

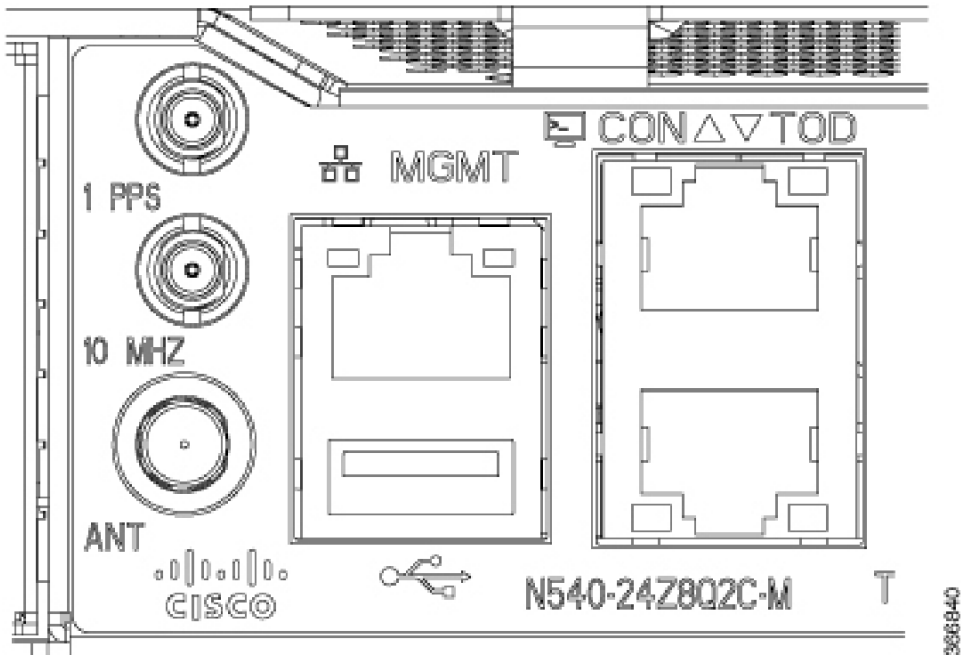
ConnecttotheManagementEthernetPort

ThemanagementEthernetportprovidesout-of-bandmanagement,whichenablesyoutousethecommand-line interface(CLI)tomanagetherouterbyitsIPaddress.Thisportusesa10/100/1000Ethernetconnectionwith anRJ-45interface.

Note Topreventan IPaddressconflict,donotconnectthemanagementEthernetportuntiltheinitial iscomplete.

Toconnectcablestothesystemmanagementport,attachCategory5cablesdirectlytotheRJ-45receptacle onthemanagementEthernetport.

Figure53:ConsolePort



Note TocomplywithGR-1089-CORE,theintra-cablingorwiringthatisgroundedatbothends.

Beforeyoubegin

Youmustcompleteinitialrouterconfiguration.

Procedure

Step1 PlugthecabledirectlyintotheRJ-45receptacle.

Step2 ConnectthenetworkendofyourRJ-45cabletoaswitch,hub,repeater,orotherexternalequipment.

ConnectingTimingCables

Note WheninstallingthecablestotheRSPs,werecommendthatyouleaveaserviceloopofextracafantrayremoval.

Thefollowingsectionsdescribehowtoconnecttimingcablestotherouter:

ConnectingaCabletotheBITSInterface

Thefollowingstepsdescribehowtoconnectacabletotherouter’sBITSport:

Procedure

Step1 Confirmthattherouterispoweredoff.
Step2 ConnectoneendofthecabletotheBITSportusingastraight-through,shieldedRJ48C-to-
Step3 RJ48Ccable. ConnecttheotherendtotheBTSpatchordemarcationpanelatyoursite.
Step4 Turnonthepowertotherouter.

Note
TheuseoftwoBITSsourcesoraY-cableisoptional.EachBITSinputportisroutedtoboththeRSPs,sothattheSETS deviceoneachRSPhasvisibilitytoboththeBITSinputs.

Warning
TocomplywiththeTelcordiaGR-1089NEBSstandardforelectromagneticcompatibilityandsafety,connecttheBITS portsonlytointra-buildingorunexposedwiringorcable.Theintrabuildingcablemustbeshieldedandtheshieldmust begroundedatbothends.Theintra-buildingport(s)oftheequipmentorsubassemblymustnotbemetallicallyconnected tointerfacesthatconnecttotheOSPoritswiring.Theseinterfacesaredesignedforuseonlyasintra-buildinginterfaces (Type2orType4portsasdescribedinGR-1089-CORE)andrequireisolationfromtheexposedOSPcabling.The additionofPrimaryProtectorsisnotsufficientprotectioninordertoconnecttheseinterfacesmetallicallytoOSPwiring.

ConnectingCablestoaGPSInterface

Thefollowingsectionsdescribehowtoconnectcablesfromtheroutertoa GPSunitforinputoroutputtiming offrequency:

ConnectingaCabletotheInput10MHzor1PPSInterface

Procedure

Step1 Connectoneendofamini-coaxcabletotheGPSunit.
Step2 Connecttheotherendofthemini-coaxcabletothe10MHzor1PPSportontheRSPoftherouter.

ConnectingaCabletotheOutput10MHzor1PPSInterface

Procedure

Step1 Connectoneendofamini-coaxcabletotheSlaveunit.
Step2 Connecttheotherendofthemini-coaxcabletothe10MHzor1PPSportoftherouter.

ConnectingaCabletotheToDInterface

Procedure

Step1 Connectoneendofastraight-throughEthernetcabletotheGPSunit.
Step2 ConnecttheotherendofthestraightthroughEthernetcabletotheToDor1-PPSportontheRSPoftherouter.

Warning
TocomplywiththeTelcordiaGR-1089NEBSstandardforelectromagneticcompatibilityandsafety,connecttheToD portsonlytointra-buildingorunexposedwiringorcable.Theintrabuildingcablemustbeshieldedandtheshieldmust begroundedatbothends.Theintra-buildingport(s)oftheequipmentorsubassemblymustnotbemetallicallyconnected tointerfacesthatconnecttotheOSPoritswiring.Theseinterfacesaredesignedforuseasintra-buildinginterfacesonly (Type2orType4portsasdescribedinGR-1089-CORE)andrequireisolationfromtheexposedOSPcabling.The additionofPrimaryProtectorsisnotsufficientprotectioninordertoconnectthesеinterfacesmetallically toOSPwiring.

Note
FormoreinformationaboutGPS-portpinouts,see*Pinouts*table.

ConnectingaCabletotheGNSSAntennaInterface

Note TheGNSSmoduleisnothotswappable.

1. ConnectoneendofashieldedcoaxialcabletotheGNSSRFINport.
2. SMAMattingcableassemblyTorqueshouldbemaintainedwithin3in-lb.ForCiscoN540-CiscoN540X-ACC-SYS,andCiscoN540-ACC-SYSnutandwashermayberemovedwhenyouusea slightlylongermatingSMAconnectortoensurecontactwiththeconnector.
3. Connecttheotherendoftheshieldedcoaxialcabletothe GNSSantenna.Useapassivesplitter ifmore thanoneGNSSmodulesarefedfromasingleantenna.

InstallandRemoveTransceiverModules

InstallandRemoveSFPModules

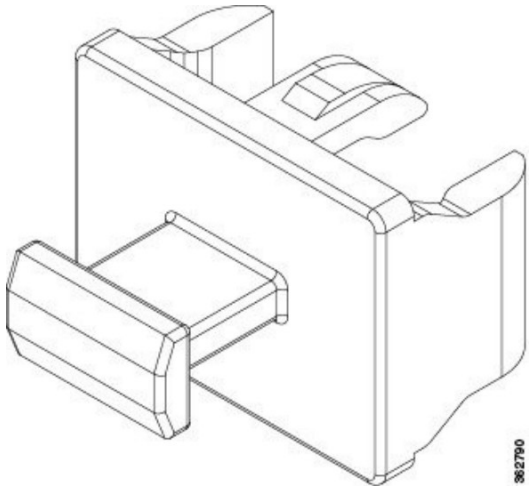
BeforeyouremoveorinstallanSFPorSFP+module,readtheinstallationinformationinthissection.

Warning **Statement1051—**LaserRadiation

Invisiblelaserradiationmaybeemittedfromdisconnectedfibersorconnectors.Donotstareintobeamsor viewdirectlywithopticalinstruments.

Caution Protectthelinecardbyinsertingacleansfp/opticalmodulecagewhenthereisnoSFPorSFP+moduleinstalled.

Figure54:SFP/SFP+ModuleCageCover



Caution ProecttheSFPorSFP+modulesbyinsertingcleandustcoversintothemafterthecablesaresuretocleantheopticsurfacesofthefibercablesbeforeyouplugthembackintotheopticalportsofanother module.Avoidgettingdustandothercontaminantsintotheopticalportsofyour SFPorSFP+modules, becausetheopticsdonotworkcorrectlywhenobstructedbydust.

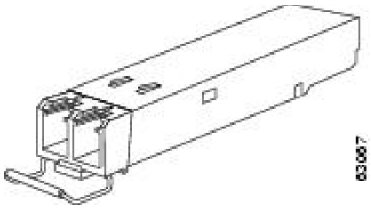
Caution WestronglyrecommendedthatyoudonotinstallorremovetheSFPorSFP+modulewithfiber-attachedtoitbecauseofthepotentialofdamagingthecable,thecableconnector,ortheopticalinterfacesin themodule.DisconnectallcablesbeforeremovingorinstallinganSFPorSFP+module.Removingand insertingamodulecanshortenitsusefullife,soyoushouldnotremoveandinsertmodulesanymorethanis absolutelynecessary.

Note WheninstallinganSFPorSFP+module,youshouldhearaclickasthetriangularpinonthebotto modulesnapsintotheholeinthereceptacle.Theclickindicatesthatthemoduleiscorrectlyse atedandsecured inthereceptacle.Verifythatthemodulesarecompletelyseatedandsecuredintheirassigned receptacleson thelinecardbyfirmlypushingoneachSFPorSFP+module.

BaleClaspSFPorSFP+Module

ThebaleclaspSFPorSFP+modulehasaclaspthatyouusetoremoveorinstallthemodule(see thefigure below).

Figure55:BaleClaspSFPorSFP+Module



InstallaBaleClaspSFPorSFP+Module

ToinstallthistypeofSFPorSFP+module,followthesesteps:

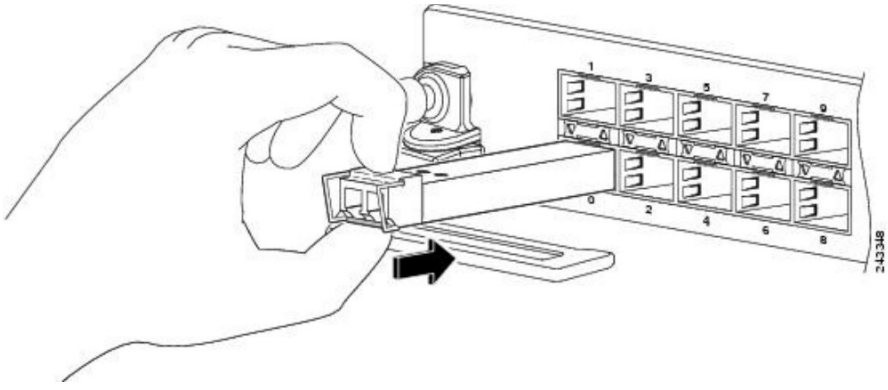
Procedure

Step1 AttachanESD-

Step2 preventivewristoranklestrapandfollowitsinstructionsforuse.

Step3 ClosethebaleclaspbeforeinsertingtheSFPmodule.

Figure56:InstallingaBaleClaspSFPModuleintoaPort



Note WheninstallinganSFPorSFP+module,youshouldhearaclickasthetriangularpinonthebottomoftheSF Pmodule snapsintotheholeinthereceptacle.Thisclickindicatesthatthemoduleiscorrectlyseatedandsecuredin thereceptacle.

VerifythattheSFPmodulesarecompletelyseatedandsecuredintheirassignedreceptaclesontheline cardbyfirmly pushingoneachSFPmodule.

RemoveaBaleClaspSFPorSFP+Module

ToremovethistypeofSFPorSFP+module,followthesesteps:

Procedure

Step1 AttachanESD-preventivewristoranklestrapandfollowitsinstructionsforuse.

Step2 Disconnectandremoveallinterfacecablesfromtheports;notethecurrentconnectionsofthecablestot linecard.

Step3

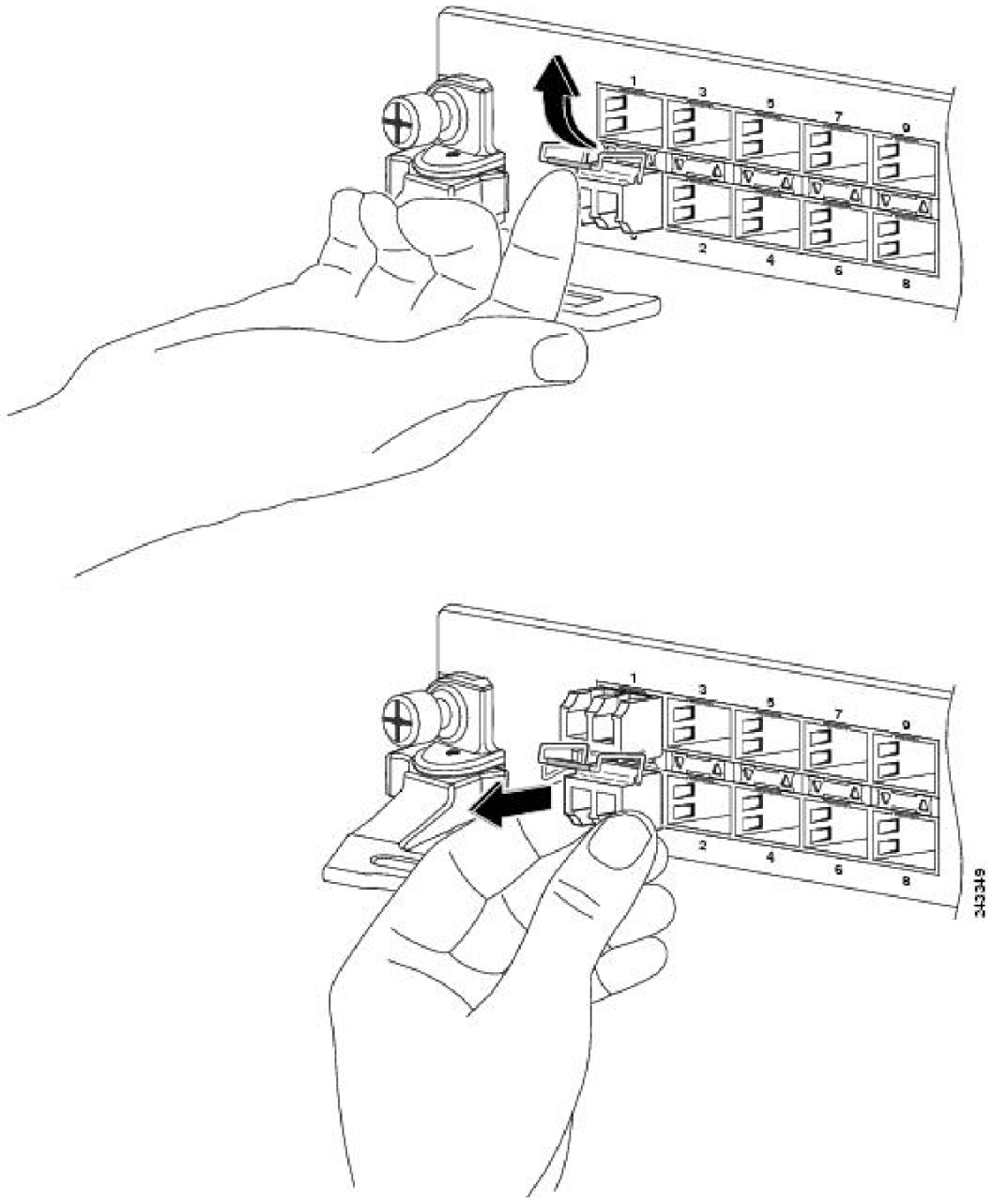
OpenthebaleclaspontheSFPmodulewithyourindexfinger,asshowninthefigurebelow.Ifthebaleclaspisobstructed andyoucannotuseyourindexfingertoopenit,useasmallflat-bladescrewdriverorotherlong,narrowinstrumentto openthebaleclasp.

Step4

GrasptheSFPmodulebetweenyourthumbandindexfingerandcarefullyremoveitfromtheport,asshowninthefigur e below.

Note
Thisactionmustbeperformedduringyourfirstinstance.Afterallthеportsarepopulated,thismaynotbepo ssible.

Figure57:RemovingaBaleClaspSFPorSFP+Module



Step5

PlacetheremovedSFPmoduleonanantistaticmat,orimmediatelyplaceitinastaticshieldingbagifyouplantoretu
rn
ittothefactory.

Step6

ProtectyourlinecardbyinsertingacleanSFPmodulecagecoversintotheopticalmodulecagewhenthereisnoSFP
moduleinstalled.

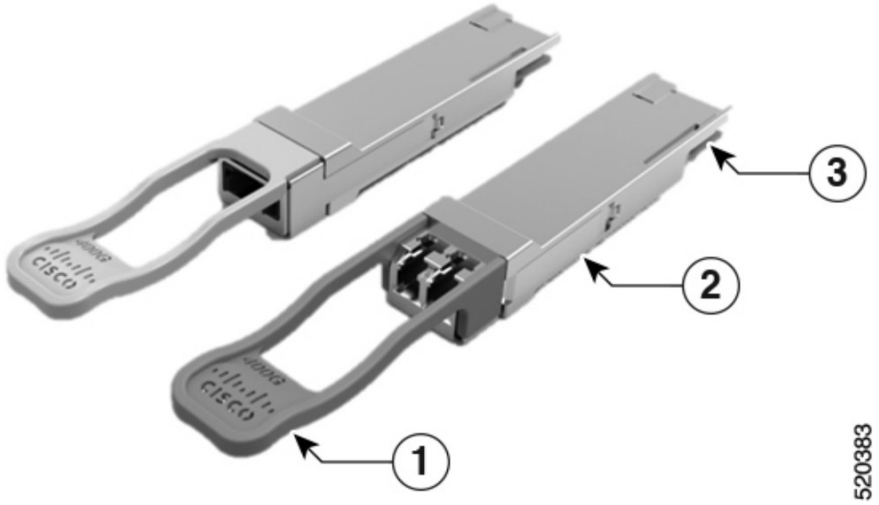
InstallandRemoveQSFPTransceiverModules

Note Inthissection,QSFPreferstoQSFP+,QSFP28,andQSFP-
*HandlingGuide*foradditionaldetailsonopticaltransceivers.

Thissectionprovidestheinstallation,cabling,andremovalinstructionsfortheQuadSmallFor m-Factor Pluggable(QSFP)transceivermodules.Themodulesarehot-swappableinput/ output(I/O)devicesthatconnect thesystem'smoduleportelectricalcircuitrywitheitheracopperorafiber-opticnetwork.

Thefollowingfigureshowsthe400-GigabitQSFP-DDtransceivermodule.

Figure58:400-GigabitQSFP-DDTransceiverModule



1	Pull-tab	2	QSFP-DDtransceiverbody
3	Electricalconnectiontothemodulecircuitry		

Warning **Statement1079—**HotSurface

Thisiconisahotsurfacewarning.Toavoidpersonalinjury,donottouchwithoutproperprotection.

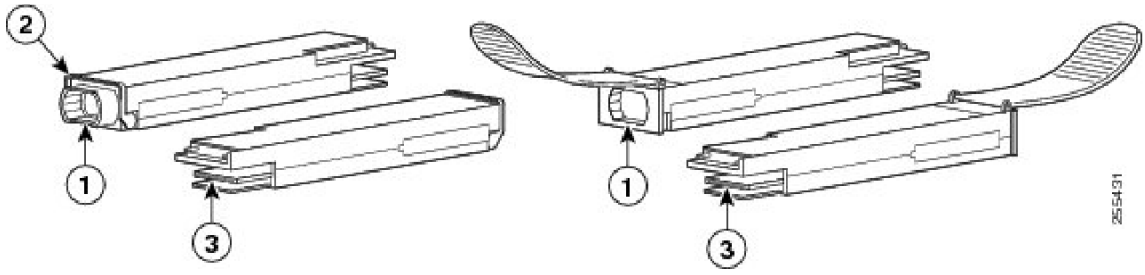
Overview

The40-Gigabit(GE)QSFP+and100Gigabit(QSFP28)transceivermoduleisahot-swappable,parallel fiber-opticalmodulewith4independentopticaltransmitandreceivechannels.Thesechannelscant erminate inanother40-GigabitQSFP+transceiver,orthechannelscanbebrokenoutto4separate10-GigabitSFP+

transceivers.TheQSFP+transceivermoduleconnectstheelectricalcircuitryofthesystem withanoptical externalnetwork.

Thefollowingfigureshowsthe40-GigabitopticalQSFP+transceiver.Thetransceiverisusedprimarilyin shortreachapplicationsinswitches,routers,anddatacenterequipmentwhereitprovideshigherdensitythan SFP+modules.The100-GigabitopticalQSFP28transceiverissimilartothe40-GigabitopticalQSFP transceiver.

Figure59:40-GigabitQSFP+TransceiverModule(Optical)



1	40GBASEQSFP+transceiverbody	3	Electricalconnectiontothemodulecircui
2	Bail-clasplatch		

RequiredToolsandEquipment

Youneedthesetoolstoinstallthetransceivermodules:

- WriststraporotherpersonalgroundingdevicetopreventESDoccurrences.
- Antistaticmatorantistaticfoamtosetthetransceiveron.
- Fiber-opticend-facecleaningtoolsandinspectionequipment.

Forinformationoninspectingandcleaningfiber-opticconnections,seeMaintainingTransceiversandOptical Cables.

Installthe100-GigabitTransceiverModule

TheQSFP+orQSFP28transceivermodulecanhaveeitherabail-clasplatchorapull-tablatch.Installation proceduresforbothtypesoflatchesareprovided.

Caution TheQSFP+orQSFP28transceivermoduleisastatic-similarindividualgroundingdevicewhenhandlingQSFP+orQSFP28transceivermodulesorcominginto contactwithsystemmodules.

ToinstallanQSFP+orQSFP28transceivermodule,followthesesteps:

Procedure

Step1 AttachanESDwriststraptoyourselfandaproperlygroundedpointonthechassisortherack.

Step2 RemovetheQSFP+orQSFP28transceivermodulefromitsprotectivepackaging.

Step3

CheckthelabelontheQSFP+orQSFP28transceivermodulebodytoverifythatyouhavethecorrectmodelforyour network.

Step4 ForopticalQSFP+orQSFP28transceivermodules,removetheopticalboredustplugandsetitaside.

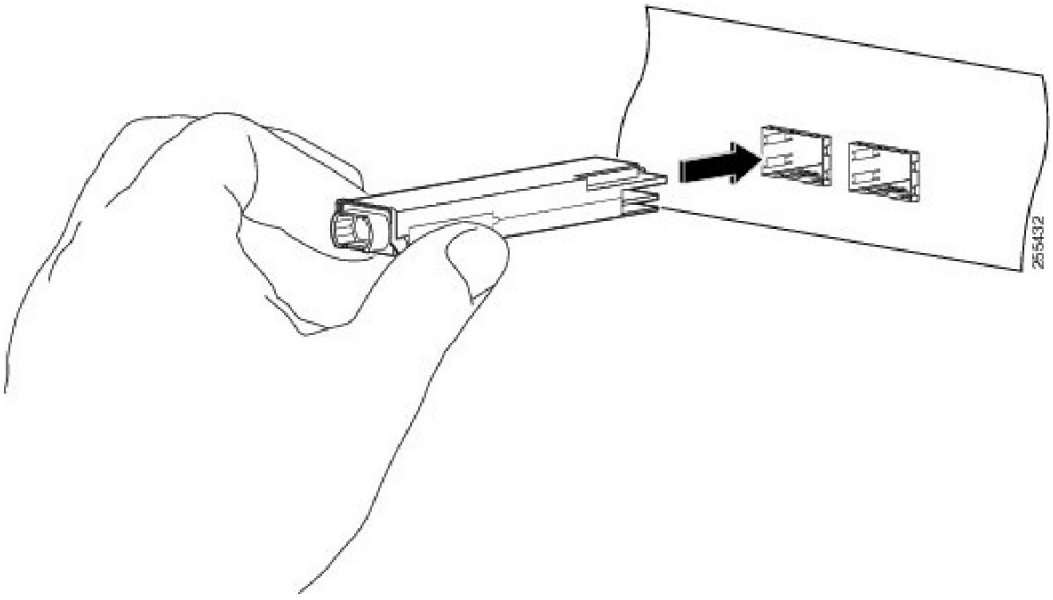
Step5 ForQSFP+orQSFP28transceivermodulesequippedwithapull-tab,holdthetransceiversothattheidentifierlabelis onthetop.

Step6 ForQSFP+orQSFP28transceivermodulesequippedwithabail-clasplatch,keepthebail-claspalignedinavertical position.

Step7

AligntheQSFP+orQSFP28transceivermoduleinfrontofthemodule’stransceiversocketopeningandcarefullyslide theQSFP+orQSFP28transceiverintothesocketuntilthetransceivermakescontactwiththesocketele ctricalconnector (seethefigurebelow).

Figure60:Installingthe100-GigabitQSFP28TransceiverModule(OpticalTransceiverEquippedwithaBail-ClaspLatchShown)



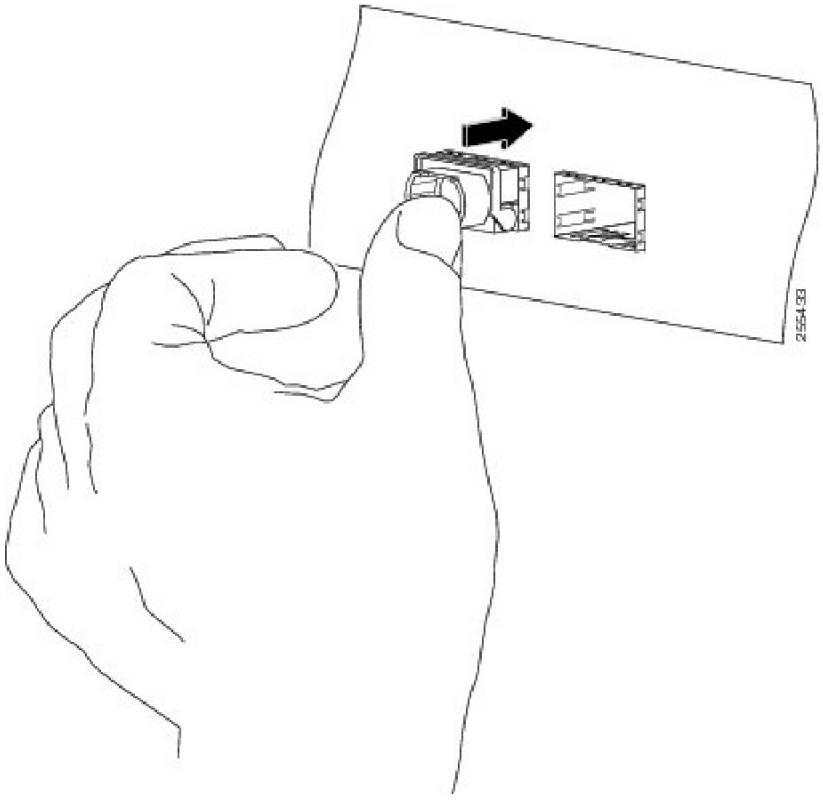
Step8

PressfirmlyonthefrontoftheQSFP+orQSFP28transceivermodulewithyourthumbtofullyseatthetransceiverin themodule’stransceiversocket(seethebelowfigure).

Caution

Ifthelatchisnotfullyengaged,youmightaccidentallydisconnecttheQSFP+orQSFP28transceivermodule.

Figure61:Seatingthe100-GigabitQSFP28TransceiverModule(OpticalTransceiverEquippedwithaBail-ClaspLatchShown)



Step9

ForopticalQSFP+orQSFP28transceivermodules,reinstallthedustplugintotheQSFP+orQSFP28transceiversoptical

boreuntilyouarereadytoattachthenetworkinterfacecable.Donotremovethedustpluguntilyouarereadytoattach thenetworkinterfacecable.

AttachtheOpticalNetworkCable

Beforeyoubegin

Beforeyouremovethedustplugsandmakeanyopticalconnections,followtheseguidelines:

- Keeptheprotectivedustplugsinstalledintheunpluggedfiber-opticcableconnectorsandinthetransceiver opticalboresuntilyouarereadytomakeaconnection.
- InspectandcleantheMPOconnectorendfacesjustbeforeyoumakeanyconnections.For complete informationoninspectingandcleaningfiber-opticconnections,seethe*InspectionandCleaning ProceduresforFiber-OpticConnections*document.
- GrasptheMPOconnectoronlybythehousingtoplugorunplugafiber-opticcable.

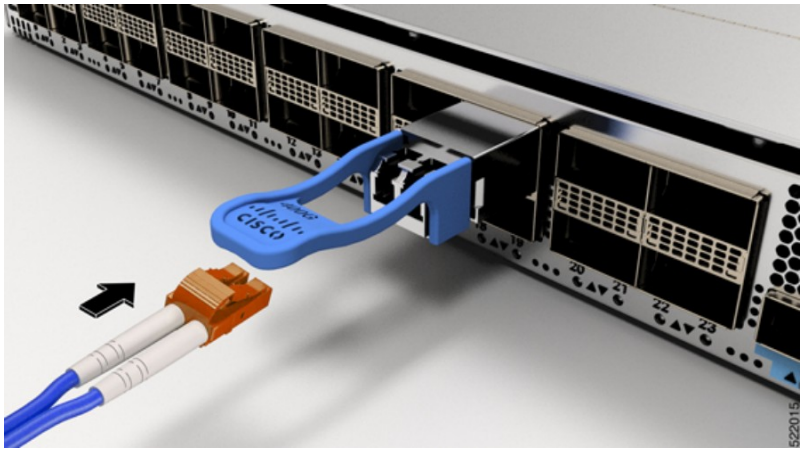
Note QSFPtransceivermodulesarekeyedtopreventincorrectinsertion.

Note Themultiple-fiberpush-cableswitheitherphysicalcontact(PC)orultra-physicalcontact(UPC)flatpolishedfacetypes.TheMPO connectorsontheopticalQSFPtransceiversdonotsupportnetworkinterfacecableswithanangle-polished contact(APC)facetype.

Procedure

Step1 RemovethedustplugsfromtheopticalnetworkinterfacecableMPOconnectors.Savethedustplugsfo
Step2 rfutureuse. InspectandcleantheMPOconnector’sfiber-opticendfaces.
Step3 Removethedustplugsfromthetransceivermoduleopticalbores.
Step4 ImmediatelyattachthenetworkinterfacecableMPOconnectorstothetransceivermodule(seeth

Figure62:CablingaTransceiverModule



Removethe100-GigabitQSFP28TransceiverModule

Caution TheQSFP+orQSFP28transceivermoduleisastatic-similarindividualgroundingdevicewhenhandlingQSFP+orQSFP28transceivermodulesorwhencoming intocontactwithmodules.

ToremoveaQSFP+orQSFP28transceivermodule,followthesesteps:

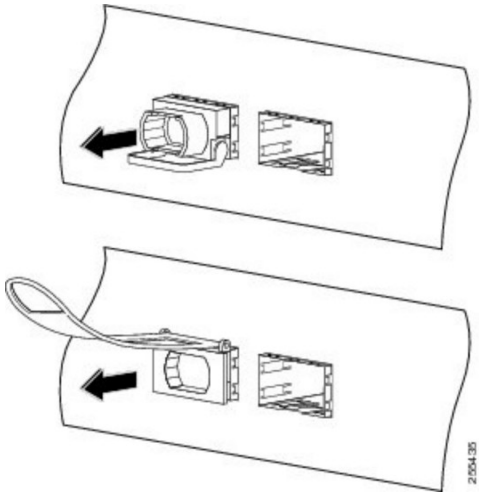
Procedure

Step1 ForopticalQSFP+orQSFP28transceivermodules,disconnectthenetworkinterfacecablefromtheQSF transceiverconnector.

Step2 ForQSFP+orQSFP28transceivermodulesequippedwithabail-clasplatch(seethebelowfigure,topview):
a) Pivotthebail-claspdowntothehorizontalposition.
b)Immediatelyinstallthedustplugintothetransceiversopticalbore.
c) GraspthesidesoftheQSFP+orQSFP28transceiverandslideitoutofthemodulesocket.

Step3 ForQSFP+orQSFP28transceiversequippedwithapulltablatch(seethebelowfigure,bottomview):
a) Immediatelyinstallthedustplugintothetransceiver'sopticalbore.
b)Graspthetabandgentlypulltoreleasethetransceiverfromthesocket.
c) Slidethetransceiveroutofthesocket.

Figure63:Removingthe100-GigabitQSFP28TransceiverModule



Step4 PlacetheQSFP+orQSFP28transceivermoduleintoanantistaticbag.

ConnectInterfacePorts

Youcanconnectopticalinterfaceportsonwithotherdevicesfornetworkconnectivity.

ConnectaFiber-OpticPorttotheNetwork

Dependingonthemodelthatyouareusing,youcanuseeitherQSFP+orQSFP28transceivers.Some transceiversworkwithfiber-opticcablesthatyouattachtothetransceiversandothertransceiversworkwith pre-attachedcoppercables.Wheninstallingfiber-opticcablesforaport,youmustinstallSFPtransceivers for1-GigabitopticalportsorinstallSFP+transceiversfor10-GigabitopticalportsorQSFP+transceiversfor 100-Gigabitportsbeforeinstallingthefiber-opticcableinthetransceivers.

⚠

Caution Removingandinstallingatransceivercanshortenitsusefullife.Donotremoveandinserttranthanitisabsolutelynecessary.Werecommendedthatyoudisconnectcablesbeforeinstallingorremoving transceiverstopreventdamagetothecableortransceiver.

DisconnectOpticalPortsfromtheNetwork

Whenyouneedtoremovefiber-optictransceivers,youmustfirstremovethefiber-opticcablesfromthe transceiverbeforeyouremovethetransceiverfromtheport.

MaintainTransceiversandOpticalCables

Tomaintainhighsignalaccuracyandtopreventdamagetotheconnectors,transceiversandfiber-opticcables mustbekeptcleanandfreeofdust.Attenuation(lossoflight)isincreasedbycontaminationandshouldbe below0.35dB.

Considerthefollowingmaintenanceguidelines:

- Transceiversarestaticsensitive.TopreventESDdamage,wearanESD-preventativewriststrapthatis connectedtothegroundedchassis.
- Donotremoveandinsertatransceivermorethanitisnecessary.Repeatedremovalsandinsertionscan shortenitsusefullife.
- Keepallopticalconnectionscoveredwhennotinuse.Cleanthembeforeusetopreventdustfrom scratchingthefiber-opticcableends.
- Donottouchtheendsofconnectors.Touchingtheendswouldleavefingerprintsandcauseother contamination.
- Cleantheconnectorsregularly;therequiredfrequencyofcleaningdependsupontheenvironment.In addition,cleanconnectorsiftheyareexposedtodustorhavebeenaccidentallytouched. Bothwetand drycleaningtechniquescanbeeffective;refertoyoursite'sfiber-opticconnectioncleaningprocedures.
- Inspectroutinelyfordustanddamage.Cleanandtheninspectfiberendsunderamicroscopetodetermine whetheranydamagehasoccurred.

CHAPTER 5

ConfiguretheDevice

Beforeyoubeginthistask,ensurethatyouhavereadandunderstoodthesafetywarningsinth eSafetywith Electricitysectionofthe SafetyWarningshandouttopic.

ConfiguringtheCiscoNCS540involvesthesetasks:

- CreatetheInitialRouterConfiguration,onpage91
- VerifyDeviceInstallation,onpage93

CreatetheInitialRouterConfiguration

YoumustassignanIPaddresstotheroutermanagementinterfacesothatyoucanthenconnec ttherouterto thenetwork.

Whenyouinitiallypoweruptherouter,itbootsupandasksaseriesofquestionstohelpconfigure therouter.
Toenableyoutoconnecttherouter tothenetwork,youcanusethedefaultchoicesforeachconfi guration exceptfortheIPaddress,whichyoumustprovide.

Note Beawareoftherouter'suniquenametoidentifyitamongtheotherdevicesinthenetwo

Beforeyoubegin

- Aconsoledevicemustbeconnectedwiththerouter.
- Therouter mustbeconnectedtoapowersource.
- DeterminetheIPaddressandnetmaskneededfortheManagementinterfaces:MgmtEth0/ RP0/CPU0/0
  andMgmtEth0/RP1/CPU0/0:

Procedure

Step1 Poweruptherouter.

TheLEDsoneachpowersupplylightup(green)whenthepowersupplyunitsaresendingpowertotherou ter,andthe softwareasksyoutospecifyapasswordtousewiththerouter.

Step2

Whenthesystemisbootedupforthefirsttime,anewusernameandapasswordistobecreated.Thefollowingprompt appears:

```
!!!!!!!!!!!!!!!!!!!!NOroot-systemusernameisconfigured.Needtoconfigureroot-systemusername. !!!!!!!!!!!!!!!!!!!!

---AdministrativeUserDialog---


Enterroot-systemusername:
%Entrymustnotbenull.

Enterroot-systemusername:root
Entersecret:
Usethe'configure'commandtomodifythisconfiguration.
UserAccessVerification

Username:root
Password:


RP/0/RP0/CPU0:ios#
```

Step3 Enteranewpasswordtouseforthisrouter.

Thesoftwarechecksthesecuritystrengthofitandrejectsyourpasswordifitisnotconsideredtobeastrongpassword.

Toincreasethesecuritystrengthofyourpassword,makesurethatitadherestothefollowingguidelines:

- Atleasteightcharacters
- Minimizesoravoidstheuseofconsecutivecharacters(suchas"abcd")
- Minimizesoravoidsrepeatingcharacters(suchas"aaa")
- Doesnotcontainrecognizablewordsfromthedictionary
- Doesnotcontainpropernames
- Containsbothuppercaseandlowercasecharacters
- Containsbothnumbersandletters

Note
Cleartextpasswordscannotincludethedollarsign($)specialcharacter.

Tip
Ifapasswordistrivial(suchasashort,easy-to-decipherpassword),thesoftwarerejectsthepasswordconfiguration.Be suretoconfigureastrongpasswordasdescribedbytheguidelinesinthisstep.Passwordsarecasesensitive. Ifyouenterastrongpassword,thesoftwareasksyoutoconfirmthepassword.

Step4 Reenterthepassword.

Whenyouenterthesamepassword,thesoftwareacceptsthepassword.

Step5 EntertheIPaddressforthemanagementinterface.

Step6 Enteranetworkmaskforthemanagementinterface.

Step7

Thesoftwareasks whetheryouwanttoedittheconfiguration.Enter**no**tonotedittheconfiguration

.

Step8 Thesoftwareaskswhetheryouwanttosavetheconfiguration.Enter**yes**tosavetheconfiguration.

VerifyDeviceInstallation

AfterinstallingtheCiscoNCS540Router,youcanusethe**show**commandstoverifytheinstallationand configuration.Ifanyissueisdetected,takecorrectiveactionbeforemakingfurtherconfigurations.

Procedure

Step1 **showinventory**

Example:

```
#showinventory
```

Displaysinformationaboutthefieldreplaceableunits(FRUs),includingproductIDs,serialnumbers,anddversionIDs.

Step2 **adminshowenvironment**

Example:

```
#adminshowenvironment
```

Displaysallenvironment-relatedrouterinformation.

Step3 **showenvironmenttemperature**

Example:

```
#showenvironmenttemperature
```

Displaystemperaturereadingsforcardtemperaturesensors.Eachsystemcontroller,routeprocessor,linecard,andfabric cardhastemperaturesensorswithtwothresholds:

- Minortemperaturethreshold:whenaminorthresholdisexceeded,aminoralarmoccursandthefollowingactions occurforallfoursensors:
  - Systemmessagesdisplayed
  - SNMPnotifications(ifconfigured)sent
  - Logenvironmentalalarmeventtriggered(canbereviewedbyrunningtheshowalarmcommand).
- Majortemperaturethreshold:whenamajorthresholdisexceeded,amajoralarmoccursandthefollowingactions occur:
  - Forsensors1,3,and4(outletandonboardsensors),thefollowingactionsoccur:
  - Systemmessagesdisplayed
    - SNMPnotifications(ifconfigured)sent
    - Logenvironmentalalarmeventtriggered(canbereviewedbyrunningtheshowalarmcommand).
  - Forsensor2(intakesensor),thefollowingactionsoccur:
    - Ifthethresholdisexceededinaswitchingcard,onlythatcardisshutdown.

- Ifthethresholdisexceededinanactiverouteprocessorcardwith HA-standbyorstandbypresent,only thatrouteprocessorcardisshutdownandthestandbyrouteprocessorcardtakesover.
- Ifyoudonothaveastandbyrouteprocessorcardinyourrouter,youhaveupto2minutestodecreasethe temperature.Duringthisinterval,thesoftwaremonitorsthetemperatureevery5seconds andcontinuously sendssystemmessagesasconfigured.

Note
Werecommendthatyouinstalldualrouteprocessorcards.Ifyouareusingarouterwithoutdualrouteprocessorcards, werecommendthatyouimmediatelyreplacethefancardevenifjustonefanisnotworking.

Step4 **hw-modulelocation<loc>shutdown**or**[no]hw-moduleshutdownlocation<loc>**

Example:

```
#hw-modulelocation<loc>shutdown
```

Powersuporshutsdownacardgracefully.

Step5 **showenvironmentpower**

Example:

```
#showenvironmentpower
```

Displaysthepowerusageinformationfortheentirerouter.

Step6 **showenvironmentvoltage**

Example:

```
#showenvironmentvoltage
```

Displaysthevoltagefortheentirerouter.

Step7 **showenvironmentcurrent**

Example:

```
#showenvironmentcurrent
```

Displaysthecurrentenvironmentstatus.

Step8 **showenvironmentfan**

Example:

```
#showenvironmentfan
```

Displaysthestatusofthefantrays.

CHAPTER 6

Replace Fan Module and Power Supply

Before you begin this task, ensure that you have read and understood the safety warnings in the Safety with Electricity section of the Safety Warnings handout topic.

Note Replacing the fan module is applicable only for Cisco N540X-16Z4G8Q2C-A/D, N540-N540X-ACC-SYS, and N540-ACC-SYS variants.

Note Replacing power supply module is applicable only for Cisco N540-24Z8Q2C-SYS, N540X-N540X-ACC-SYS, and N540-ACC-SYS variants.

Replace Fan Module

Caution If you cannot replace a fan tray within three minutes, we recommend that you leave it in the chassis are prepared to replace it within that specified time limit.

Note If you remove more than one fan tray at a time during operations, the router allows up to 2 minutes before shutting down, unless you replace extra missing fan trays within that time. If the router senses an over temperature condition when multiple fan trays are removed, the shutdown can occur in less than 2 minutes.

Procedure

Step 1 Unscrew the captive thumbscrew at the front of the fan tray.

Figure64:RemoveFanModulefromtheChassis

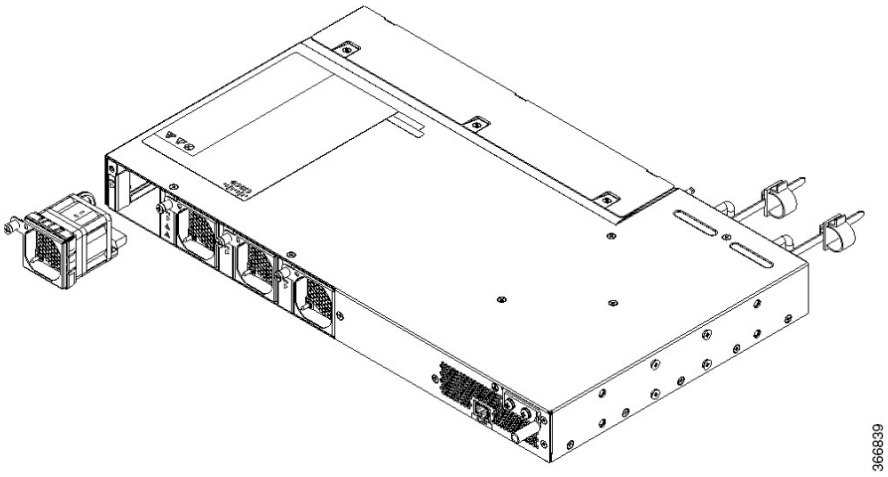
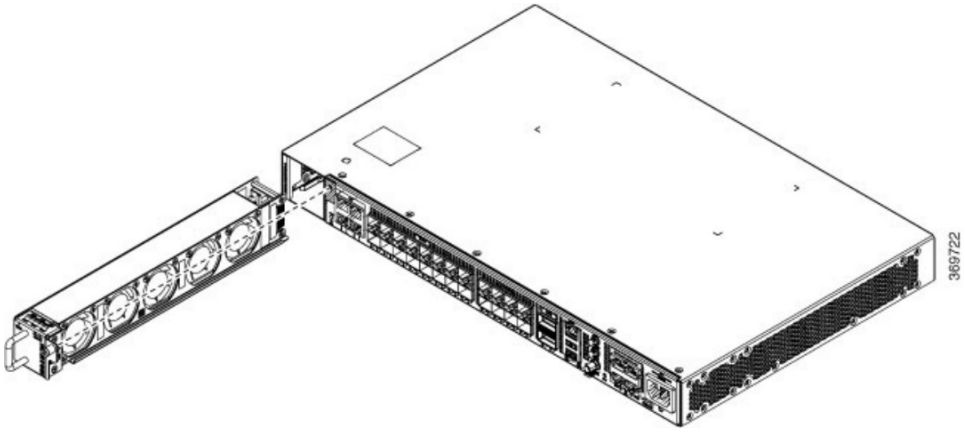


Figure65:RemoveFanTrayfromtheChassis(N540X-16Z4G8Q2C-A)



Step2 Pullthefantraytoremovethefantraytobereplaced.

Step3 HoldthefanmodulewiththeLEDandPIDlabelatthetop.

Step4

Alignthefanmoduletotheopenfantrayslotinthechassisandpressthemoduleallthewayintotheslotuntiltheleft andrightlatchesclickandlockonthechassis.

Step5

Ifthechassisispoweredon,listenforthefans.Youshouldimmediatelyheartheminoperation.Ifyoudonothearthem, ensurethatthefanmoduleisinsertedcompletelyinthechassis.

Step6 VerifythatthefanmoduleLEDisgreen.IftheLEDisnotgreen,oneormorefansarefaulty.

ReplacePowerSupply

Therouterprovidesachoiceoftwodifferentpowersupplies:

- DCpower—TheDCpowersupplyusestwo-positionterminalblock-styleconnectorwithpositivelatching orsecuring,andlabeledconnectionsfor+24/48V,GRD,-24/48V.Theterminalblockconnectorisof

suitablesizetocarrytheappropriateAWGwiresizetohandletheinputcurrentofthepowersupply.No ON/OFFswitchisprovided.
•ACpower—TheACpowersupplyhasanIEC320-typepowerreceptacleanda15Ampserviceconnector.

Youcanusestandardrightanglepowercordswiththe ACpowersupply.Thepowersupplyincludesa powercordretainer.NoON/OFFswitchisprovided.

Youcaninstalldualpowersuppliesforredundancy.

Note Productsthathaveanacpowerconnectionarerequiredtohaveanexternalspdprovidedaspbuildinginstallationtocomplywiththetelcordiagr-1089nebsstandardforelectromagneticcompatibility andsafety.

Caution Donotuseinterfacemoduleandpowersupplyejectorhandlestoliftthechassis;usingthehandchassiscandeformordamagethehandles.

PSURedundancyLostAlarm:
PSUredundancylostalarmsaregeneratedwhenthereisnoproperinputfeedappliedonanyoneofPower Modules(PMs)
(PM0orPM1).Thealarmsarealsogeneratedwhentheoutputfor PM0orPM1isnotproper.

Note ThisisapplicabletofixedPSUsonly.

ThefollowingalarmsareraisedforPSUredundancylosteventwithafaultyPM0: •PowerModuleGenericFault

•PowerModuleError

•PowerGroupRedundancyLost

ThisisapplicabletothefollowingrouterswithfixedPSUs:

•N540-28Z4C-SYS-A/D

•N540X-16Z4G8Q2C-A/D

•N540X-16Z8Q2C-D

•N540-12Z20G-SYS-A/D

•N540X-12Z16G-SYS-A/D

RemovetheDCPowerSupplyModule

Thissectionprovidesinformationaboutremovingandreplacing theDCpowersupply.

Warning **Statement1003—**DCPowerDisconnection

Toreduceriskofelectricshockorpersonalinjury,disconnectDCpowerbeforeremovingo rreplacing componentsorperformingupgrades.

FollowthesestepstoremoveandreplacetheDCpowersupply:

Procedure

Step1 Beforeservicingthepowersupply,switchoffthecircuitbreakerinyourequipmentarea.Asanadditional tapethecircuit-breakerswitchintheOffposition.

Step2 SliponthеESD-preventivewriststrapthatisincludedintheaccessorykit.

Step3 Switchthepowersupplycircuit-breakerswitchtotheOff(O)position.

Step4 Pullthеterminalblockplugconnectoroutoftheterminalblockheadinthepowersupply.

(Seethefollowingfigure.) Step5 LoosenthecaptivescrewsontheDCpowersupply.

Step6

Graspthepowersupplyhandle.Pressthepowersupplylocktowardstheleftandsimultaneouslypullthepowersup ply

outfromthechassiswhilesupportingitwiththeotherhand.

InstalltheDCPowerSupplyModule

ThisequipmentissuitableforinstallationinNetworkTelecommunicationsFacilitiesandlocati onswherethe NECapplies.

ThisequipmentissuitableforinstallationsutilizingtheCommonBondingNetwork(CBN).

ThegroundingarchitectureofthisproductisDC-Isolated(DC-I)forDC- poweredproducts.DC-powered productshaveanominaloperatingDCvoltageof48VDC.

PerformthefollowingproceduretoinstallthepowersupplymodulE:

Procedure

Step1 Ensurethatthesystem(earth)groundconnectionhasbeenmade.Seethefollowingfigure.

Step2 Ifnecessary,removetheblankpowersupplyfillerplatefromthechassispowersupplybayopeningbylo captiveinstallationscrews.

Step3

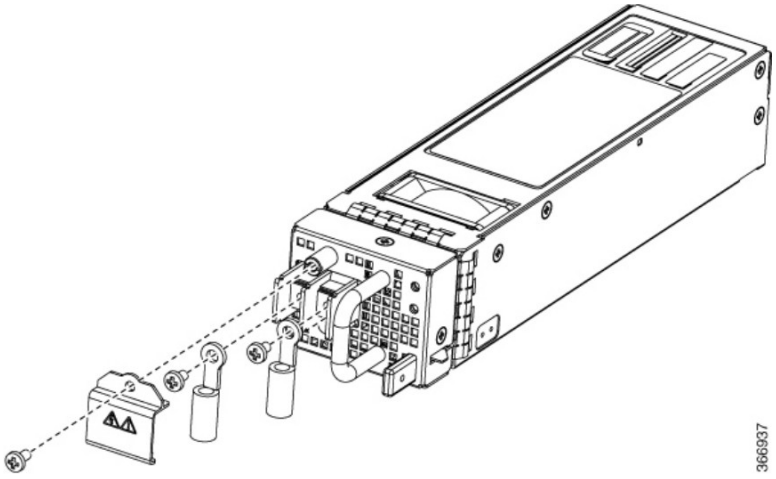
VerifythatpowertotheDCcircuitconnectedtothepowersupplyyouareinstallingisoff.Toensurethatpowerhasbeen removedfromtheDCcircuits,locatethecircuitbreakersfortheDCcircuits,switchthecircuitbreaker stotheOFF position,andtapethecircuit-breakerswitchesintheOFFposition.

Step4

Graspthepowersupplyhandlewithonehand.Placeyourotherhandunderneaththepowersupply.Slidethepower supplyintothepowersupplybay.Makesurethatthepowersupplyisfullyseatedinthebay.

Step5 Tighten[redacted]thecaptiveinstallationscrewsofthepowersupply.Therecommendedmaximumtorqueis5.5in.-lb([redacted])

Figure66:InstallDCPowerSupplyModule



RemovetheACPowerSupplyModule

Thissectiondescribeshowtoremoveandreplacethe ACpowersupply.

Warning **Statement1046—**InstallingorReplacingtheUnit

Toreduceriskofelectricshock,wheninstallingorreplacingtheunit,thegroundconnectionmustalwaysbe madefirstanddisconnectedlast.

Ifyourunithasmodules,securethemwiththeprovidedscrews.

Warning **Statement1074—**ComplywithLocalandNationalElectricalCodes

Toreduceriskofelectricshockorfire,installationoftheequipmentmustcomplywithlocalandnational electricalcodes.

Followthesestepstoremoveandreplacethe ACpowersupply:

Procedure

Step1 Disconnectthepowercordfromthepowersource.Donottouchanymetalonthepowercordwhenitisstill tothepowersupply.

Step2 Loosenthetieandremovethepowercordfromthetie-andholder.

Step3 Removethepowercordfromthepowerconnectiononthepowersupply.Donottouchthemetalprongsembeddedin thepowersupply.

Step4

Graspthepowersupplyhandle.Pressthepowersupplylocktowardstheleftandsimultaneouslypullthepowersupply outfromthechassiswhilesupportingitwiththeotherhand.

InstalltheACPowerSupplyModule

FollowthesestepstoinstalltheACpowersupplymodule:

Procedure

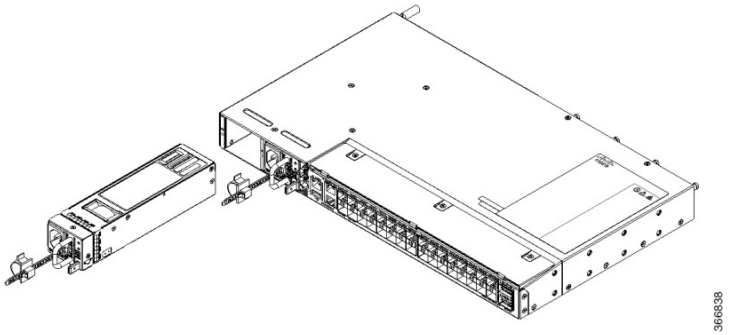
Step1 Ensurethatthesystem(earth)groundconnectionhasbeenmade.

Step2 Ifnecessary,removetheblankpowersupplyfillerplatefromthechassispowersupplybayopeningbylo captiveinstallationscrews.

Step3

Graspthepowersupplyhandlewithonehand.Placeyourotherhandunderneaththepowersupply.Slidethepower supplyintothepowersupplybay.Makesurethatthepowersupplyisfullyseatedinthebay.Seethefollowing figure.

Figure67:InstallACPowerSupplyModule



Step4 SlidetheACpowersupplycordinsidethetieofthetie-and-

Step5 holderandtightenthetiearoundthepowersupplycord.

APPENDIX A

Appendix

CertaintroubleshootingaidsoftheCiscoNCS540enableyoutoperformthesetasksthatassistthe troubleshootingprocess:

- LEDs,onpage101
- SystemSpecifications,onpage107

LEDs

Note TheCiscoNCS540RouterLEDsaresimilarformostofthevariants,andanydifferencesbetweenarespecificallycalledout.

RouterLEDs

AllthedataportLEDsintheCiscoNCS540Routerisatthefrontpanel.Thereare5LEDsthatreflectthe differentstatusesofthesystem.

Note Thefollowingtableisapplicableonlyfor CiscoN540-24Z8Q2C-SYS,N540X-ACC- variants.

Table23:RouterLEDDescriptions

LED	Color	Status
STATUS	Green	Themoduleisoperationalandhasnoactivemajororcriticalalarms.
	Amber	HostkernelisbootedandisreadytostartSysAdminVM.
	Red	Power-unfailureispreventingtheCPUfrombooting(setbyhardware).
	FlashingAmber (Slow)	Themoduleisbootingup(setbyIOFPGA).
	FlashingAmber (Fast)	Themoduleisbootingup(setbyBIOS),shuttingdown,ortheSysAdmin VMisbeingreloaded.
	FlashingRed	RP0hasactivemajororcriticalalarms.
	Off	Themoduleispowered-off(setbyhardware).
ALARM	Red	Criticalalarm-system-scope(includingRP0).
	FlashingRed	Criticalalarm-Relatingtovoltagerailfailures.
	Amber	Majoralarm-system-scope(includingRP0).
	FlashingAmber	Minoralarm-system-scope(includingRP0).
	Off	Noalarm.
SYNC	Green	Timecoreissynchronizedtoanexternalsourceincluding IEEE 1588.
	FlashingGreen	SystemisinSynchronousEthernetmode.
	Amber	AcquiringstateorHoldover:Timecoreisinacquiringstateorholdover mode.
	Off	Timecoreclocksynchronizationisdisabledorinfree-runningstate.
STATUS+ ALARM(Both LEDs)	FlashingRed	SecureBootbootflashcontentsvalidationfailed. (setbyIOFPGA). Thiscaseisonlyapplicableimmediatelyafterpower-on.
TIMING	Off	GPSconfigandGPSportisdown.Time-of-day(ToD),1PPS,and10 MHzportsarenotprovisionedordisabled.
	Amber	ToD,1PPS,and10MHzsignalsarenotvalid.
	Green	GPSportisup.ToD,1PPS,and10MHzsignalsarevalid.

LED	Color	Status
GNSS	Off	GNSSisnotconfigured.
	Green	GNSSNormalState.Self-surveyiscomplete.
	Red	Powerup.GNSSisnottrackinganysatellite.
	Amber	Autoholdover.
	FlashingGreen	Learningstate–normal.Self-surveyisnotcompleted.

Note Thefollowingtableisapplicableonlyfor CiscoN540-28Z4C-SYS-A/D,N540-12Z20G-N540X-16Z4G8Q2C-A/D,N540X-16Z8Q2C-DandN540-12Z20G-SYS-A/Dvariants.

Table24:RouterLEDDescriptions

LED	Color	Status
Alarm	Red	Criticalalarm-system-scope(includingRP0).
	Amber	Majoralarm-system-scope(includingRP0).
	FlashingAmber	Minoralarm-system-scope(includingRP0).
	Off	Noalarm.
Status	Green	Themoduleisoperationalbuthasnoactivemajoror criticalalarms.
	Amber	HostkernelbootedandXRisbooting.
	FlashingRed	NotApplicable.

FanAssemblyLEDs

CiscoNCS540has4fansatthebackpanel.ThereisanLEDoneachfanassemblyandtheyreflectthe differentstatusofthefans.

Note Thefollowingtableisapplicableonlyfor CiscoN540-24Z8Q2C-SYS,N540X-16Z8Q2C-andN540-ACC-SYSvariants.

Table25:FanAssemblyLEDDescriptions

LED	Color	Status
STATUS	Green	Fansareoperatingnormally.
	Amber	Singlefanfailure.
	Red	MorethanonefanfailureorasinglePSUfanfailure.
	Off	Fantrayisnotreceivingpower.

Note ThefollowingtableisapplicableonlyforCiscoN540-28Z4C-SYS-A/D,N540-12Z20G-N540X-12Z16G-SYS-A/D,andN540X-16Z4G8Q2C-A/Dvariants.

Table26:FanAssemblyLEDDescriptions

LED	Color	Status
FAN	Green	Fansareoperatingnormally.
	Amber	Singlefanfailure.
	Red	MorethanoneorsinglefanfailureorsinglePSUfanfailure(on lyon N540-28Z4C-SYS-A/DandN540-12Z20G-SYS-A/Dvariant s)and

PowerSupplyLEDs

Note ThefollowingtableisapplicableonlyforCiscoN540-24Z8Q2C-SYS,N540X-16Z8Q2C-andN540-ACC-SYSvariants.

Table27:PowerSupplyLEDDescriptions

POWERLED	FAILLED	PowerSupplyCondition
Green	Off	PowerSupplyON;validinput/output.

POWERLED	FAILLED	PowerSupplyCondition
Amber1Hz flashing	Red1Hzflashing	PSUWarningdueto: •Overcurrent •Overtemperature •Undervoltage •Overvoltage •Overpower •Fanfailure
Off	On	PSUfailuredueto: •Overcurrent •Overtemperature •Undervoltage •Overvoltage •Overpower •Fanfailure
Green1Hz flashing	Off	Powersupplyisnotpluggedintothechassisorshutdownbythe system
Off	Off	Novalidpowerinput.
Amber	Off	Lowinputvoltage.

Note ThefollowingtableisapplicableonlyforCiscoN540-28Z4C-SYS-A/D,N540-12Z20G-N540X-12Z16G-SYS-A/D,andN540X-16Z4G8Q2C-A/Dvariants.

Table28:PowerSupplyLEDDescriptions

LED	Color	Status
PWR	Green	PowerSupplyONandoperatingnormally.
	Off	NotreceivingpowerorPSU-12Vfailor3V3STDBYfailure.
	Red	Powerfailurewithoneoftheinputpowerfeedsfailedoroneoftheon-boardvoltagerailshasfailed.
	Amber	STDBYFPGAupgradeisinprogressduetopostReload/Powercycle afterHWFPDupgradeAll. Note UpgradeoftheSTDBYFPGAtakes3–5minutes.

FanAssemblyandPowerSupplyLEDCombination

Note ThefollowingtableisapplicableonlyforCiscoN540-28Z4C-SYS-A/D,N540-12Z20G-N540X-12Z16G-SYS-A/D,andN540X-16Z4G8Q2C-A/Dvariants.

Table29:FanAssemblyandPowerSupplyLEDCombinationDescriptions

FanLED	PowerLED	Status
Off	Red	Powerfailurewithoneoftheinputpower feedsfailedoroneoftheon-boardvoltage railshasfailed.
—	Amber	STDBYFPGAupgradeisinprogressdue to postReload/PowercycleafterHWFPDupgradeAll. Note UpgradeoftheSTDBYFPGAtakes3–5 minutes.
Green	FlashingAmber	Thermalshutdownwithnofan
FlashingRed	FlashingRed	Thermalshutdown
FlashingRed	FlashingAmber	MSSReady=0
FlashingAmber	FlashingGreen	TAMinitfail
FlashingAmber	FlashingRed	TAMNotReady
FlashingAmber	FlashingAmber	SECUREJTAGFail
FlashingGreen	FlashingGreen	BIOSValidationFailure

FanLED	PowerLED	Status
Off	Green	PowerSupplyONandoperatingnormally

SystemSpecifications

CertaintroubleshootingaidsoftheCiscoNCS540enableyoutoperformthesetasksthatassistthe troubleshootingprocess:

WeightandPowerConsumption

Forinformationonphysicalspecificationsandpowerconsumption,seetable*CiscoNCS 540chassis specification*ontheCiscoNetworkConvergenceSystem540RouterDataSheet.

EnvironmentalSpecifications

Forinformationonenvironmentalspecifications,seetable*EnvironmentalpropertiesforNCS 540fixedsystems* ontheCiscoNetworkConvergenceSystem540RouterDataSheet.

Thermallimitations

ThistabledescribesthemaximumoperatingtemperaturerangesupportedfortheNCS540chassiswhenusing specificopticsmodules,identifiedbytheirproductIDs(PIDs).Itdetails:

- Opticsmodule:Themodeloftheopticsmodule.
- ChassisPID:Thespecificchassisorsystemproductsthatsupporttheseopticsmodules.
- Systemmaximumandminimumoperatingtemperaturesupportedat MSL: Maximumoperating temperaturesupportedbytheNCS540systematMeanSeaLevel(MSL).
- Portssupported:Thespecificportsonthechassiswheretheopticsmodulescanbeinstalled.

Appendix

Table30:Thermallimitations

Opticsmodule	ChassisPID	Maximum operating temperat	Portssupported
SFP-10G-OLT20-X	•N540-24Z8Q2C-SYS •N540-ACC-SYS	•+50C	•P0,P2,P4,P6,P8,P10,P12, P14, P16,P18, P20,P22,P24,P26,P28,P30
	•N540X-16Z4G8Q2C-D **•N540X-**	•+50C	•P4,P5,P6,P7,P8,P9,P10,P11,P13, P15,P17,P19,P21,P23,P25,P27
	•N540-28Z4C-SYS-D **•N540-28Z4C-SYS-A**	•+50C	•P0,P1,P2,P3,P5,P7,P9,P11, P13,P15,P17,P19,P21,P23,P25,P27
QSFP-100G-ZR4-S	•N540-28Z4C-SYS-D •N540-28Z4C-SYS-A	•+55C	•P28andP30
DWDM-SFP10G-C-I	•N540X-12Z16G-SYS-A •N540X-12Z16G-SYS-	•+65C	•P20toP27
S10G-LR-PM-D-I	•N540-24Z8Q2C-SYS •N540-28Z4C-SYS-A/D•N540-12Z20G-SYS-A/D•N540X-12Z16G-SYS-A/D•N540X-16Z4G8Q2C -A/D	•+68C •+68C •+68C •+65C •+65C	•Allports(P0-31) •P3toP25 •P20toP31 •P16toP27 •P4toP19
S10G-SR-PM-D-I	•N540-24Z8Q2C-SYS •N540-28Z4C-SYS-A/D•N540X-12Z16G-SYS-A/D•N540-12Z20G-SYS-A/D•N540X-16Z4G8Q2C-A/D	•+69C •+69C •+65C •+69C •+65C	•Allports(P0-31) •P3toP25 •P16toP27 •P20toP31 •P4toP19
S10G-ER-PM-D-I	•N540-24Z8Q2C-SYS •N540-28Z4C-SYS-A/D•N540X-16Z4G8Q2C-A/D•N540X-12Z16G-SYS-A/D	•+60C •+60C •+63C •+60C	•Allports(P0-31) •P3toP25 •P4toP19 •P16toP27

Opticsmodule	ChassisPID	Maximum operating temperat	Portssupported
DP01QS28-E20	•N540X-16Z4G8Q2C-A •N540-24Z8Q2C-M	•+45C	•Two100GEports

EMCcompliance

Thistabledescribesthemaximumnumberofportssupportedonvarious NCS540mediumdensityrouter modelswhenusingspecificopticsmodules.Itdetails:

- Opticsmodule:Themodeloftheopticsmodule.
- ChassisPID:Thespecificchassisorsystem productIDsthatsupporttheseopticsmodules.
- Maximumnumberofsupportedports:Referstothehighestnumberofportsonachassis thatcanbe supportedtomeetelectromagneticcompatibility(EMC)andelectromagneticinterference(EMI) compliance.

Table31:EMCcompliance

Opticsmodule	ChassisPID	Maximumnumberof supportedports
S10G-LR-PM-D-I	•N540-24Z8Q2C-SYS •N540-28Z4C-SYS-A/D •N540-12Z20G-SYS-A/D•N540X-12Z16G-SYS-A/D•N540X-16Z4G8Q2C-A/D	6
S10G-SR-PM-D-I	•N540-24Z8Q2C-SYS •N540-28Z4C-SYS-A/D •N540X-12Z16G-SYS-A/D•N540-12Z20G-SYS-A/D•N540X-16Z4G8Q2C-A/D	6
S10G-ER-PM-D-I	•N540-24Z8Q2C-SYS •N540-28Z4C-SYS-A/D •N540X-16Z4G8Q2C-A/D•N540X-12Z16G-SYS-A/D	6

TransceiverandCableSpecifications

Todeterminewhichtransceiversandcablesaresupportedbythisrouter,seeCiscoTransceiverModules CompatibilityInformation.

Toseethetransceiverspecificationsandinstallationinformation,seeCiscoTransceiverModulesInstalland UpgradeGuides.

RJ-45Connectors

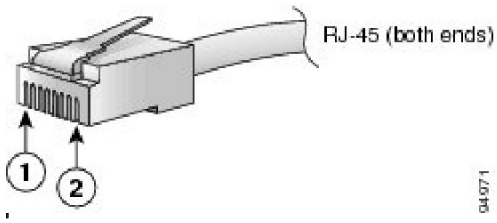
TheRJ-45connectorconnectsCategory3,Category5,Category5e,Category6,orCategory6Afoiltwisted-pair orunshieldedtwisted-paircablefromtheexternalnetworktothefollowingmoduleinterfaceconnectors:

- Routerchassis
  - CONSOLEport
  - MGMTETHport

Caution TocomplywithGR-(FTP)cablethatisproperlygroundedatbothends.

ThefollowingfigureshowstheRJ-45connector.

Figure68:RJ-45Connector



1	Pin1	2	Pin2

GPSPortPinouts

TheplatformiscapableofreceivingorsourcingGPSsignalsof1PPS&10MHz.Theseinterfacesare providedbytwomini-coax50-Ohm,1.0/2.3DINseriesconnectoronthefrontpanel.Similarlytherearetwo mini-coax50-Ohmconnectorsprovidedinthefrontpaneltooutputthis1PPSand10MHz.

ThistablebelowsummarizestheGPSportpinouts:

Table32:GPSPortPinouts

	10MHz(InputandOutput)	1PPS(InputandOutput)
Waveform	Input—Sinewave Output—Squarewave	Input—Rectangularpulse Output—Rectangularpulse

	10MHz(InputandOutput)	1PPS(InputandOutput)
Amplitude	Input—>1.7voltp-p(+8to+10dBm) Output—	Input—>2.4voltsTTLcompatible Output—
Impedance	50ohms	50ohms
Pulse Width	50%dutycycle	26microseconds
RiseTime	Input—ACcoupled Output—5nanoseconds	40nanoseconds

Time-of-DayPortPinouts

ThistablesummarizestheToD/1-PPSportpinouts:

Table33:RJ-45ToD/1-PPSPortPinouts

Pin	SignalName	Direction	Description
1	–	–	–
2	–	–	–
3	1PPS_N	OutputorInput	1PPSRS422signal
4	GND	–	–
5	GND	–	–
6	1PPS_P	OutputorInput	1PPSRS422signal
7	TOD_N	OutputorInput	Time-of-Daycharacter
8	TOD_P	OutputorInput	Time-of-Daycharacter

BITSInterface

ThistablesummarizestheBITSinterfaceRJ48portpinouts:

Table34:BITSInterfaceRJ48PortPinouts

Pin	Signal Name	Direction	Description
1	RXRing	Input	ReceiveRing
2	RXTIP	Input	ReceiveTIP(T1/E1)

Pin	Signal Name	Direction	Description
3,6,7,8	—	NC	—
4	TXRing	Output	TransmitRing
5	TXTIP	Output	TransmitTIP (T1/E1)

ManagementandPTPEthernetPortPinouts

ThisfollowingtablesummarizestheManagementandPrecisionTimeProtocol(PTP)Ethernetportpinouts:

Table35:ManagementandPTPEthernetPortPinouts

Pin	SignalName
1	TRP0+
2	TRP0-
3	TRP1+
4	TRP1-
5	TRP2+
6	TRP2-
7	TRP3+
8	TRP3-

USBPortPinouts

ThisfollowingtablesummarizestheUSBportpinouts:

Table36:USBPortPinouts

Pin	SignalName	Description
A1	Vcc	+5VDC
A2	D-	Data-
A3	D+	Data+
A4	Gnd	Ground

AlarmPortPinouts

Thefollowingtablesummarizestheexternalalarminputpinoutsforthefollowing NCS540routervariants:

- N540-ACC-SYS
- N540X-ACC-SYS
- N540-24Z8Q2C-SYS
- N540X-16Z8Q2C-D
- N540-28Z4C-SYS

Table37:ExternalAlarmInputPinouts

Pin	SignalName	Description
1	ALARM0_IN	Alarminput0
2	ALARM1_IN	Alarminput1
3	—	Noconnect
4	ALARM2_IN	Alarminput2
5	ALARM3_IN	Alarminput3
6	—	Noconnect
7	—	Noconnect
8	COMMON	Alarm common

Thefollowingtablesummarizestheexternalalarminputpinoutsforthefollowing NCS540routervariants:

- N540-28Z4C-SYS-A/D
- N540X-16Z4G8Q2C-A/D
- N540-12Z20G-SYS-A/D
- N540X-12Z16G-SYS-A/D

Table38:ExternalAlarmInputPinouts

Pin	SignalName	Description
1	ALARM0_IN	Alarminput0
2	ALARM1_IN	Alarminput1
3	—	Alarmoutputclosed
4	ALARM2_IN	Alarminput2

Pin	SignalName	Description
5	ALARM3_IN	Alarminput3
6	—	Alarmoutputopen
7	—	AlarmoutputCOM
8	—	AlarminputCOM

EffectiveCiscoIOSXRRelease7.3.1,youcanenableexternalalarmsforexternaldoors,voltage,fire,thermal, andwatersensorsonthefollowingvariantsofCiscoNCS540:

- N540-24Z8Q2C-SYS
- N540X-ACC-SYS
- N540-ACC-SYS

Tosetthedescription:

sysadmin-vm:0_RP0(config)#alarm-contact*contact-number*description*description*

Tosettheseverityofthealarm:

sysadmin-vm:0_RP0(config)#alarm-contact*contact-number*severity[critical|major |minor]

EffectiveCiscoIOSXRRelease7.4.1,youcanenableexternalalarmsforexternaldoors,voltage,fire,thermal, andwatersensorsonthefollowingvariantsofCiscoNCS540:

- N540-28Z4C-SYS-A/D
- N540-12Z20G-SYS-A/D
- N540X-16Z4G8Q2C-A/D
- N540X-12Z16G-SYS-A/D

Tosetthedescription:

RP/0/RP0/CPU0:ios(config)#environmentalarm-contact*contact-number*description *description*

Tosettheseverityofthealarm:

RP/0/RP0/CPU0:ios(config)#environmentalarm-contact*contact-number*severity [critical|major|minor]

Tosetthetriggerforthealarm:

RP/0/RP0/CPU0:ios(config)#environmentalarm-contact*contact-number*trigger[open |closed]

Note Youcanconfigureuptofourexternalalarms.

The*contact-number*isthepinnumberoftheconnectedalarmport,thatisAlarminput0toAlarminput3.

The**description**stringcanbeupto80alphanumericcharactersinlengthandisincludedina nygenerated systemmessages.

For**severity**,enteranyoneof:**critical**,**major**,or**minor**.

Descriptionandseverityarebothmandatoryvalues.

Usethe**showalarms**commandinadminmodetoviewthealarmdetails.Usethe**showloggi ng**command toviewthedisplaysthestateofsyslogerrorandeventlogging.

AnSNMPtrapissentforeveryexternalalarmthatisraisedorclearedonthesystem.

ConsolePortPinouts

ThefollowingtablesummarizestheConsoleportpinouts.

Note ThefollowingtableisapplicableonlyforCiscoN540-24Z8Q2C-SYS,N540X-ACC- variants.

Table39:ConsolePortPinouts

Pin	SignalName	Direction	Description
1	Loop1	NA	Loopback1
2	Loop2	NA	Loopback2
3	TxD	Output	ConsoleRS232transmit
4	Gnd	NA	Ground
5	Gnd	NA	Ground
6	RxD	Input	ConsoleRS232receive
7	Loop2	NA	Loopback2
8	Loop1	NA	Loopback1

Note ThefollowingtableisapplicableonlyforCiscoN540-28Z4C-SYS-A/D,N540-12Z20G- N540X-12Z16G-SYS-A/D,andN540X-16Z4G8Q2C-A/Dvariants.

Table40:ConsolePortPinouts

Pin	SignalName	Direction	Description
1	ACONS-TX	Output	AuxConsolestransmitoutput , RS232
2	NC	NA	ReceiveTIP(T1/E1)

Pin	SignalName	Direction	Description
3	CONS-TX	Output	ConsoleRS232transmit
4	Gnd	NA	Ground
5	Gnd	NA	Ground
6	CONS-RX	Input	ConsoleRS232receive
7	ACONS-RTX	Input	AuxConsolesreceiveinput,RS232
8	NC	NA	NA