Installation — SFP and SFP+ transceivers Avaya Virtual Services Platform 4000

Release 3.0.0.0
NN46251-301
Issue 01.03
January 2014

Notice

While reasonable efforts have been made to ensure that the information in this document is complete and accurate at the time of printing, Avaya assumes no liability for any errors. Avaya reserves the right to make changes and corrections to the information in this document without the obligation to notify any person or organization of such changes.

Documentation disclaimer

“Documentation” means information published by Avaya in varying mediums which may include product information, operating instructions and performance specifications that Avaya generally makes available to users of its products. Documentation does not include marketing materials. Avaya shall not be responsible for any modifications, additions, or deletions to the original published version of documentation unless such modifications, additions, or deletions were performed by Avaya. End User agrees to indemnify and hold harmless Avaya, Avaya's agents, servants and employees against all claims, lawsuits, demands and judgments arising out of, or in connection with, subsequent modifications, additions or deletions to this documentation, to the extent made by End User.

Link disclaimer

Avaya is not responsible for the contents or reliability of any linked websites referenced within this site or documentation provided by Avaya. Avaya is not responsible for the accuracy of any information, statement or content provided on these sites and does not necessarily endorse the products, services, or information described or offered within them. Avaya does not guarantee that these links will work all the time and has no control over the availability of the linked pages.

Warranty

Avaya provides a limited warranty on its hardware and Software (“Product(s)”). Refer to your sales agreement to establish the terms of the limited warranty. In addition, Avaya’s standard warranty language, as well as information regarding support for this Product while under warranty is available to Avaya customers and other parties through the Avaya Support website: http://support.avaya.com. Please note that if you acquired the Product(s) from an authorized Avaya Channel Partner outside of the United States and Canada, the warranty is provided to you by said Avaya Channel Partner and not by Avaya. “Software” means computer programs in object code, provided by Avaya or an Avaya Channel Partner, whether as stand-alone products or pre-installed on hardware products, and any upgrades, updates, bug fixes, or modified versions.

Licenses

THE SOFTWARE LICENSE TERMS AVAILABLE ON THE AVAYA WEBSITE, HTTP://SUPPORT.AVAYA.COM/LICENSEINFO ARE APPLICABLE TO ANYONE WHO DOWNLOADS, USES AND/OR INSTALLS AVAYA SOFTWARE, PURCHASED FROM AVAYA INC., ANY AVAYA AFFILIATE, OR AN AUTHORIZED AVAYA CHANNEL PARTNER (AS APPLICABLE) UNDER A COMMERCIAL AGREEMENT WITH AVAYA OR AN AUTHORIZED AVAYA CHANNEL PARTNER. UNLESS OTHERWISE AGREED TO BY AVAYA IN WRITING, AVAYA DOES NOT EXTEND THIS LICENSE IF THE SOFTWARE WAS OBTAINED FROM ANYONE OTHER THAN AVAYA, AN AVAYA AFFILIATE OR AN AVAYA AUTHORIZED AVAYA CHANNEL PARTNER; AVAYA RESERVES THE RIGHT TO TAKE LEGAL ACTION AGAINST YOU AND ANYONE ELSE USING OR SELLING THE SOFTWARE WITHOUT A LICENSE. BY INSTALLING, DOWNLOADING OR USING THE SOFTWARE, OR AUTHORIZING OTHERS TO DO SO, YOU, ON BEHALF OF YOURSELF AND THE ENTITY FOR WHOM YOU ARE INSTALLING, DOWNLOADING OR USING THE SOFTWARE (HEREINAFTER REFERRED TO INTERCHANGEABLY AS “YOU” AND “END USER”), AGREE TO THESE TERMS AND CONDITIONS AND CREATE A BINDING CONTRACT BETWEEN YOU AND AVAYA INC. OR THE APPLICABLE AVAYA AFFILIATE (“AVAYA”).

Avaya grants you a license within the scope of the license types described below, with the exception of Heritage Nortel Software, for which the scope of the license is detailed below. Where the order documentation does not expressly identify a license type, the applicable license will be a Designated System License. The applicable number of licenses and units of capacity for which the license is granted will be one (1), unless a different number of licenses or units of capacity is specified in the documentation or other materials available to you. “Designated Processor” means a single stand-alone computing device. “Server” means a Designated Processor that hosts a software application to be accessed by multiple users.

Licence types

Designated System(s) License (DS). End User may install and use each copy of the Software only on a number of Designated Processors up to the number indicated in the order. Avaya may require the Designated Processor(s) to be identified in the order by type, serial number, feature key, location or other specific designation, or to be provided by End User to Avaya through electronic means established by Avaya specifically for this purpose.

Heritage Nortel Software

“Heritage Nortel Software” means the software that was acquired by Avaya as part of its purchase of the Nortel Enterprise Solutions Business in December 2009. The Heritage Nortel Software currently available for license from Avaya is the software contained within the list of Heritage Nortel Products located at http://support.avaya.com/LicenseInfo under the link “Heritage Nortel Products”. For Heritage Nortel Software, Avaya grants Customer a license to use Heritage Nortel Software provided hereunder solely to the extent of the authorized activation or authorized usage level, solely for the purpose specified in the Documentation, and solely as embedded in, for execution on, or (in the event the applicable Documentation permits installation on non-Avaya equipment) for communication with Avaya equipment. Charges for Heritage Nortel Software may be based on extent of activation or use authorized as specified in an order or invoice.

Copyright

Except where expressly stated otherwise, no use should be made of materials on this site, the Documentation, Software, or hardware provided by Avaya. All content on this site, the documentation and the Product provided by Avaya including the selection, arrangement and design of the content is owned either by Avaya or its licensors and is protected by copyright and other intellectual property laws including the sui generis rights relating to the protection of databases. You may not modify, copy, reproduce, republish, upload, post, transmit or distribute in any way any content, in whole or in part, including any code and software unless expressly authorized by Avaya. Unauthorized reproduction, transmission, dissemination, storage, and or use without the express written consent of Avaya can be a criminal, as well as a civil offense under the applicable law.

Third Party Components

“Third Party Components” mean certain software programs or portions thereof included in the Software that may contain software (including open source software) distributed under third party agreements (“Third Party Components”), which contain terms regarding the rights to use certain portions of the Software (“Third Party Terms”). Information regarding distributed Linux OS source code (for those Products that have distributed Linux OS source code) and identifying the copyright holders of the Third Party Components and the Third Party Terms that apply is available in the Documentation or on Avaya’s website at: http://support.avaya.com/Copyright. You agree to the Third Party Terms for any such Third Party Components.

Preventing Toll Fraud

“Toll Fraud” is the unauthorized use of your telecommunications system by an unauthorized party (for example, a person who is not a corporate employee, agent, subcontractor, or is not working on your

company's behalf). Be aware that there can be a risk of Toll Fraud associated with your system and that, if Toll Fraud occurs, it can result in substantial additional charges for your telecommunications services.

Avaya Toll Fraud intervention

If you suspect that you are being victimized by Toll Fraud and you need technical assistance or support, call Technical Service Center Toll Fraud Intervention Hotline at +1-800-643-2353 for the United States and Canada. For additional support telephone numbers, see the Avaya Support website: http://support.avaya.com. Suspected security vulnerabilities with Avaya products should be reported to Avaya by sending mail to: securityalerts@avaya.com.

Trademarks

The trademarks, logos and service marks (“Marks”) displayed in this site, the Documentation and Product(s) provided by Avaya are the registered or unregistered Marks of Avaya, its affiliates, or other third parties. Users are not permitted to use such Marks without prior written consent from Avaya or such third party which may own the Mark. Nothing contained in this site, the Documentation and Product(s) should be construed as granting, by implication, estoppel, or otherwise, any license or right in and to the Marks without the express written permission of Avaya or the applicable third party.

Avaya is a registered trademark of Avaya Inc.

All non-Avaya trademarks are the property of their respective owners. Linux® is the registered trademark of Linus Torvalds in the U.S. and other countries.

Downloading Documentation

For the most current versions of Documentation, see the Avaya Support website: http://support.avaya.com.

Contact Avaya Support

See the Avaya Support website: http://support.avaya.com for product notices and articles, or to report a problem with your Avaya product. For a list of support telephone numbers and contact addresses, go to the Avaya Support website: http://support.avaya.com, scroll to the bottom of the page, and select Contact Avaya Support.

Contents

Chapter 1: Avaya Virtual Services Platform 4000 regulatory information and safety precautions

International regulatory statements of conformity

The Avaya Virtual Services Platform 4000 series was evaluated and is certified to the international regulatory standards for electromagnetic compliance (EMC) and safety and were found to have met the requirements for the following international standards:

- EMC - Electromagnetic Emissions - CISPR 22, Class A
- EMC - Electromagnetic Immunity - CISPR 24
- Electrical Safety - IEC 60950, with CB member national deviations

The equipment has been certified as compliant with the national standards as detailed in the following sections.

National electromagnetic compliance (EMC) statements of compliance

FCC statement (USA only)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the Federal Communications Commission (FCC) rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy. If it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to take whatever measures may be necessary to correct the interference at their own expense.

ICES statement (Canada only)

Canadian Department of Communications Radio Interference Regulations

This digital apparatus (Avaya Virtual Services Platform 4000 Series) does not exceed the Class A limits for radio-noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Règlement sur le brouillage radioélectrique du ministère des Communications

Cet appareil numérique (Avaya Virtual Services Platform 4000 series) respecte les limites de bruits radioélectriques visant les appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique du ministère des Communications du Canada.

CE marking statement (Europe only)

EN 55022 statement

This is to certify that the Avaya Virtual Services Platform 4000 series equipment is shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC. Conformity is declared by the application of EN 55022 Class A (CISPR 22).

Caution:

This device is a Class A product. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users are required to take appropriate measures necessary to correct the interference at their own expense.

EN 55024 statement

This is to certify that the Avaya Virtual Services Platform 4000 series equipment is shielded against the susceptibility to radio interference in accordance with the application of Council Directive 89/336/EEC. Conformity is declared by the application of EN 55024 (CISPR 24).

EN 300386 statement

The Avaya Virtual Services Platform 4000 series equipment complies with the requirements of EN 300386 V1.4.1 for emissions and for immunity for a Class A device intended for use in either Telecommunications centre or locations other than telecommunications centres given the performance criteria as specified by the manufacturer.

European Union and European Free Trade Association (EFTA) notice

CE

All products labeled with the CE marking comply with R&TTE Directive (1995/5/EEC) which includes the Electromagnetic Compliance (EMC) Directive (89/336/EEC) and the Low Voltage Directive (73/336/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (ENs). The equivalent international standards are listed in parenthesis.

- EN 55022 (CISPR 22)–Electromagnetic Interference
- EN 55024 (IEC 61000-4-2, -3, -4, -5, -6, -8, -11)–Electromagnetic Immunity
- EN 61000-3-2 (IEC 610000-3-2)–Power Line Harmonics
- EN 61000-3-3 (IEC 610000-3-3)–Power Line Flicker

VCCI statement (Japan/Nippon only)

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI) for information technology equipment. If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

BSMI statement (Taiwan only)

This is a Class A product based on the standard of the Bureau of Standards, Metrology and Inspection (BSMI) CNS 13438 and CNS14336–1.

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

MIC notice (Republic of Korea only)

This device has been approved for use in Business applications only per the Class A requirements of the Republic of Korea Ministry of Information and Communications (MIC). This device may not be sold for use in a non-business application.

Observe the Regulatory Marking label on the back or bottom of each switch for specific certification information pertaining to this model. Each Avaya Virtual Services Platform 4000 Series model is approved for shipment to/usage in Korea and is labeled as such, with all appropriate text and the appropriate MIC reference number.

National Safety Statements of Compliance

EN 60950 statement

This is to certify that the Avaya Virtual Services Platform 4000 series equipment is in compliance with the requirements of EN 60950 in accordance with the Low Voltage Directive. Additional national differences for all European Union countries have been evaluated for compliance.

NOM statement (Mexico only)

The following information is provided on the devices described in this document in compliance with the safety requirements of the Norma Oficial Méxicana (NOM):

Exporter:	Avaya Inc. 4655 Great America Parkway Santa Clara CA 95054 USA
Importer:	Avaya Communication de México, S.A. de C.V. Av. Presidente Masarik 111 Piso 6 Col Chapultepec Morales Deleg. Miguel HIdalgo México D.F. 11570
Input:	Avaya Virtual Services Platform 4000 Series: • 4850GTS 100–240 VAC 5 A MAX 50–60 Hz • 4850GTS-PWR+ 100–240 VAC 12 A MAX 50–60 Hz

Información NOM (unicamente para México)

La información siguiente se proporciona en el dispositivo o en los dispositivos descritos en este documento, en cumplimiento con los requisitos de la Norma Oficial Méxicana (NOM):

Exportador:	Avaya Inc. 4655 Great America Parkway Santa Clara, CA 95054 USA
Importador:	Avaya Communication de México, S.A. de C.V. Av. Presidente Masarik 111 Piso 6 Col Chapultepec Morales Deleg. Miguel HIdalgo México D.F. 11570
Embarcar a:	Avaya Virtual Services Platform 4000 Series • 4850GTS 100–240 VAC 5 A MAX 50–60 Hz • 4850GTS-PWR+ 100–240 VAC 12 A MAX 50–60 Hz

Denan statement (Japan/Nippon only)

本製品を安全にご使用頂くため、以下のことにご注意ください。

- 接続ケーブル、電源コード、ACアダプタなどの部品は、必ず製品に同梱されております添付品または指定品をご使用ください。添付品・指定品以外の部品をご使用になると故障や動作不良、火災の原因となることがあります。
- 同梱されております付属の電源コードを他の機器には使用しないでください。上記注意事項を守らないと、死亡や大怪我など人身事故の原因となることがあります。

National Environmental Statements of Compliance

The WEEE Directive 2002/96/EC and RoHS (Restriction of Hazardous Substances) Directive 2002/95/EC sets collection, recycling and recovery targets for various categories of electrical products and their waste.

Restriction on Hazardous Substances Directive Compliance Statement

The Restriction on Hazardous Substances Directive (RoHS) (2002/95/EC), which accompanies the WEEE Directive, bans the use of heavy metals and brominated flame-retardants in the manufacture of electrical and electronic equipment. Specifically, restricted materials under the RoHS Directive are Lead (including solder used in PCB's), Cadmium, Mercury, Hexavalent Chromium, and Bromine.

Avaya declares compliance with the European Union (EU) RoHS Directive (2002/95/EC) in that Lead, which is a restricted hazardous substance, is used only in accordance to the exemption(s) to Articile 4(1), item 7 granted by the European Union (EU) RoHS Directive (2002/95/EC) in the Annex—"lead in solders for network infrastructure equipment for switching, signalling, transmission as well as network management for telecommunication".

WEEE Directive Compliance Statement

This product at end of life is subject to separate collection and treatment in the EU Member States, Norway, and Switzerland and therefore is marked with the symbol shown at the left. Treatment applied at end of life of these products in these countries shall comply with the applicable national laws implementing Directive 2002/96/EC on Waste of Electrical and Electronic Equipment (WEEE).
Avaya declares compliance with the European Union (EU) WEEE Directive (2002/96/EC).

Chapter 2: Introduction

Purpose

This document is used to select, install, and remove Small Form Factor Pluggable (SFP) and Small Form Factor Pluggable Plus. Specifications for each supported device are included.

Related resources

Documentation

See the *Avaya Virtual Services Platform 4000 Documentation Roadmap*, NN46251–100 for a list of the documentation for this product.

Training

Ongoing product training is available. For more information or to register, you can access the Web site at http://avaya-learning.com/.

Avaya Mentor videos

Avaya Mentor is an Avaya-run channel on YouTube that includes technical content on how to install, configure, and troubleshoot Avaya products.

Go to http://www.youtube.com/AvayaMentor and perform one of the following actions:

- Enter a key word or key words in the Search Channel to search for a specific product or topic.
- Scroll down Playlists, and click the name of a topic to see the available list of videos posted on the site.

Support

Visit the Avaya Support website at http://support.avaya.com for the most up-to-date documentation, product notices, and knowledge articles. You can also search for release notes, downloads, and resolutions to issues. Use the online service request system to create a service request. Chat with live agents to get answers to questions, or request an agent to connect you to a support team if an issue requires additional expertise.

Chapter 3: New in this release

Avaya Virtual Services Platform 4000 Installation — SFP and SFP+ transceivers, NN46251–301 is a new document for release 3.0.0.0, so all features are new in this release.

Chapter 4: Safety and equipment care information

This chapter contains important safety and regulatory information. Read this section before you install Small Form Factor Pluggable (SFP) and Small Form Factor Pluggable Plus (SFP+).

Handling, safety, and environmental guidelines

Before you install an SFP or SFP+transceiver, read the following handling, safety, and environmental guidelines:

- SFP and SFP+s are static sensitive. For more information about how to prevent damage from electrostatic discharge (ESD), see Electrostatic discharge prevention on page 19.
- Dust contamination can reduce the performance of optical parts in transceivers. When you store a transceiver, or after you disconnect it from a fiber optic cable, always keep a dust cover over the optical bore.
- Dispose of this product according to all national laws and regulations.

Electrostatic discharge prevention

To prevent equipment damage, observe the following electrostatic discharge (ESD) precautions when you handle or install the components.

- Ground yourself and the equipment to an earth or building ground. Use a grounded workbench mat (or foam that dissipates static charge) and a grounding wrist strap. The wrist strap must touch the skin and be grounded through a one megaohm resistor.
- Do not touch anyone who is not grounded.
- Leave all components in their ESD-safe packaging until installation, and use only a static-shielding bag for all storage, transport, and handling.
- Clear the area of synthetic materials such as polyester, plastic, vinyl, or styrofoam because these materials carry static electricity that can damage the equipment.

Care of fiber optic equipment

You must keep fiber optic equipment connections clean and damage-free. Use the information in this section to properly maintain and care for fiber optic equipment.

Fiber optic cable care

Although the glass fiber in fiber optic cable is protected with reinforcing material and plastic insulation, it is subject to damage. Use the following precautions to avoid damaging the glass fiber.

- Do not kink, knot, or vigorously flex the cable.
- Do not bend the cable to less than a 40 mm (1.75 inch) radius.
- Do not stand on fiber optic cable; keep the cable off the floor.
- Do not pull fiber optic cable harder than you do a cable containing copper wire of comparable size.
- Do not allow a static load of more than a few pounds on a section of the cable.
- Place protective caps on fiber optic connectors that are not in use.
- Store unused fiber optic patch cables in a cabinet, on a cable rack, or flat on a shelf.

Frequent overstressing of fiber optic cable causes progressive degeneration that leads to failure.

If you suspect damage to a fiber optic cable, either due to mishandling or an abnormally high error rate observed in one direction, reverse the cable pairs. If the high error rate appears in the other direction, replace the cable.

Warning:

Risk of equipment damage

Do not crush fiber optic cable. If fiber optic cable is in the same tray or duct with large, heavy electrical cables, it can be damaged by the weight of the electrical cable.

Fiber optic connector care

Before connecting fiber optic connectors to transmission equipment, test equipment, patch panels, or other connectors, ensure fiber optic connectors are clean. The performance of an optical fiber connector depends on how clean the connector and coupling are at the time of connection.

A damaged or dirty connector can damage the paired connector. A connector must be absolutely clean before you insert it into a transmitter or receiver.

Never clean an optical connector while it carries light. Optical power can cause ignition of the cleaning material when it contacts the end of the optical connector and destroy the connector. Typical cleaning materials, for example, tissues saturated with alcohol, combust almost instantaneously after you expose them to optical power levels of +15 dBm or higher.

Visually inspect the connector to determine cleanliness and to determine if it needs replacement. You must replace a connector that has a scratch across the core, or a scratch that appears to end in the core.

The proper connector cleaning method depends on the connector contaminants:

- Judge cleanliness by visual inspection with a fiber microscope. First inspect the connector, and then clean as required.

  Danger:

  Risk of eye injury

  When you inspect a connector, ensure that light sources are off. The light source in fiber optic cables can damage your eyes.

- If you suspect only the possibility of dust particles (for example, which can occur when you leave a connector uncapped in a clean environment), use high-quality canned air or a reel cleaner (for example, a Cletop) to clean the connector. A reel cleaner is a good choice to ensure that no dust contaminates the connector.
- If the connector is visibly dirty or you suspect it to be contaminated by chemicals (for example, matching gel), use high-quality alcohol and canned air to clean the connector. This method is the most thorough cleaning method. In some cases, a reel cleaner can suffice.

The more surface manipulation you apply to the connector, the more likely the connector is to become damaged.

When you insert a connector ferrule into a connector or adapter, ensure that the ferrule tip does not touch the outside of the mating connector or adapter. This can produce scratches and dirt deposits on the connector.

To help prevent connectors from collecting dust, cover them when not in use. To avoid the transfer of oil or other contaminants from your fingers to the end face of the ferrule, handle connectors with care. Do not touch the connector end face.

Cleaning single connectors

Clean connectors so that the optical signal is minimally attenuated by the connector.

This procedure is appropriate when you suspect more than dust contamination.

Prerequisites

- a lens-grade, lint-free tissue,for example, Kimwipes.
- an optical-grade isopropyl alcohol (IPA) (98% or more purity).
- a high-quality canned compressed air with extension tube.

  Compressed air must be free of dust, water, and oil, and film-like deposits that can scratch the surface of the connector.
- You need a fiber optic microscope to inspect connectors.

Danger:

Risk of eye injury

When inspecting a connector, ensure that light sources are off. The light source used in fiber optic cables can damage your eyes.

To avoid getting debris in your eyes, wear safety glasses when working with the canned air duster.

To avoid eye irritation on contact, wear safety glasses when working with isopropyl alcohol.

Procedure steps

1. Remove dust or debris by applying canned air to the cylindrical and end-face surfaces of the connector.
2. Gently wipe the cylindrical and end-face surfaces with a tissue dampened with optical-grade isopropyl alcohol.
3. Gently wipe the cylindrical and end-face surfaces with a dry tissue.

   Important:

   Do not let the IPA evaporate; wipe it dry immediately. Alcohols can leave a residue that is difficult to remove.
4. Dry the connector surfaces by applying canned air.
5. Inspect the connector to ensure it is clean and undamaged.

   To prevent contamination, do not touch the connector surfaces after cleaning. Cover connectors with dust caps if you are not going to use them immediately.

Cleaning duplex connectors

Clean connectors so that the optical signal is minimally attenuated by the connector.

This procedure is appropriate when you suspect more than dust contamination.

Prerequisites

- a lens-grade, lint-free tissue,for example, Kimwipes.
- an optical-grade isopropyl alcohol (IPA) (98% or more pure).
- a high-quality canned compressed air with extension tube.

  Compressed air must be free of dust, water, and oil, or filmy deposits or scratches on the surface of the connector can result.
- a fiber optic microscope to inspect connectors.

Danger:

Risk of eye injury

When you inspect a connector, ensure that light sources are off. The light source in fiber optic cables can damage your eyes.

To avoid getting debris in your eyes, wear safety glasses when you work with the canned air duster.

To avoid eye irritation on contact, wear safety glasses when you work with isopropyl alcohol.

Procedure steps

1. To remove or retract the shroud, do one of the following.
   - On removable shroud connectors, hold the shroud on the top and bottom at the letter designation, apply medium pressure, and then pull it free from the connector body. Do not discard the shroud.
   - On retractable shroud connectors, hold the shroud in its retracted position.
2. Remove dust or debris by applying canned air to the cylindrical and end-face surfaces of the connector.
3. Gently wipe the cylindrical and end-face surfaces of both ferrules using a tissue saturated with optical-grade isopropyl alcohol.
4. Gently wipe the cylindrical and end-face surfaces with a dry tissue.

Important:

Do not let the IPA evaporate; wipe it dry immediately. Alcohols can leave a residue that is difficult to remove.

5. Blow dry the connector surfaces with canned air.
6. Inspect the connector to ensure it is clean and undamaged.
7. Using care to not touch the clean ferrules, gently push the shroud back onto the connector until it seats and locks in place.

Cleaning receptacles

Clean connector receptacles or ports so that the optical signal is minimally attenuated by the connection.

Prerequisites

- an optical-grade isopropyl alcohol (IPA) (98% or more pure).
- cleaning swabs (also called cleaning sticks or wands).
- a high-quality canned compressed air with extension tube.

  Compressed air must be free of dust, water, and oil, or filmy deposits or scratches on the surface of the connector can result.

Warning:

Risk of equipment damage

To avoid contamination, optical ports must only be cleaned when there is evidence of contamination or reduced performance, or during their initial installation.

To prevent oil contamination of connectors, use only high-quality canned compressed air.

Do not allow the air extension tube to touch the bottom of the optical port.

Procedure steps

1. Remove dust or debris by blowing canned air into the optical port of the device using the canned air extension tube.
2. Clean the optical port by inserting a wand moistened with alcohol into the receptacle and rotating it.

   Each cleaning wand must only be used to clean one optical port.

3. Dry the optical port by inserting a dry wand into the receptacle and rotating it.

   Important:

   Do not let the IPA evaporate; wipe it dry immediately. Alcohols can leave a residue that is difficult to remove.

4. Remove lint by blowing compressed air into the optical port.
5. Reconnect the optical connector and check for proper function.

   If you are not reinstalling the connector, use a protective cap.

   If problems persist, ensure that the connector or receptacle is free from damage.

Product safety warnings and information

The products described in this guide meet requirements of:

- IEC 60950 3rd edition
- CSA 22.2 No. 60950 3rd edition
- UL 60950 3rd edition
- EN60950 3rd edition
- EN60825-1, +A11, +A2

ESD and installation caution messages

This section provides electrostatic discharge (ESD) and installation caution messages.

Electrostatic alert:

Risk of equipment damage

To prevent damage from electrostatic discharge, always wear an antistatic wrist strap connected to an ESD jack.

Electrostatic alert:

ATTENTION

Risque d’endommagement de l’équipement

Pour prévenir tout dommage dû à une décharge électrostatique, vous devez toujours porter un un bracelet antistatique connecté à une prise ESD.

Electrostatic alert:

ACHTUNG

Risiko eines Geräteschadens

Risiko eines Geräteschadens Um Schäden durch elektrostatische Entladung zu verhindern, tragen Sie bei der Instandhaltung dieses Produkts immer ein antistatisches Band am Handgelenk, welches mit einer ESD-Buchse verbunden ist.

Electrostatic alert:

PRECAUCIÓN

Riesgo de daño del equipo

Para prevenir el daño producido por una descarga electrostática, use siempre una pulsera antiestática conectada a un enchufe ESD.

Electrostatic alert:

CUIDADO

Risco de danos ao equipamento

Para evitar danos com descarga eletrostática, sempre use uma pulseira antiestática que esteja conectada a uma tomada ESD.

Electrostatic alert:

ATTENZIONE

Rischio di danni all'apparecchiatura

Per evitare danni derivanti da scariche elettrostatiche, indossare sempre un polsino antistatico collegato a una presa ESD.

Caution:

Risk of equipment damage

Only trained personnel can install this product.

Caution:

ATTENTION

Risque d'endommagement de l'équipement

L'installation doit être effectuée exclusivement par un personnel qualifié.

Caution:

ACHTUNG

Risiko eines Geräteschadens

Nur geschultes Personal kann dieses Produkt installieren.

Caution:
PRECAUCIÓN

Riesgo de daño del equipo

Sólo el personal capacitado puede instalar este producto.

Caution:
CUIDADO

Risco de danos ao equipamento

Somente pessoal treinado pode instalar este produto.

Caution:
ATTENZIONE

Rischio di danni all'apparecchiatura

Questo prodotto può essere installato solo da personale esperto.

Laser safety warnings

This section provides laser safety warnings.

Warning:
Risk of eye injury by laser

Fiber optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to a light source.

Warning:
AVERTISSEMENT

Risques de blessure oculaire par lumière laser L'équipement de fibres optiques peut émettre une lumière laser ou infrarouge nuisible à vos yeux. Ne regardez jamais en direction de fibres optiques ou d'un port connecteur. Supposez toujours que les câbles de fibres optiques sont connectés à une source de lumière.

Warning:

WARNUNG

Risiko einer Augenverletzung durch Laser Glasfasergeräte können Laserstrahlen oder ultraviolettes Licht aussenden, das Ihre Augen verletzen kann. Schauen Sie nie direkt in einen Glasfaserleiter oder Verbindungsanschluss. Gehen Sie immer davon aus, dass Glasfaserkabel mit einer Lichtquelle verbunden sind.

Warning:

ADVERTENCIA

Riesgo de lesión en los ojos por láser El equipo de fibra óptica puede emitir una luz láser o infrarroja que dañe sus ojos. Nunca mire un puerto de fibra óptica o conector. Siempre asuma que los cables de fibra óptica están conectados a una fuente de luz.

Warning:

AVISO

O laser pode causar ferimentos no olho O equipamento de fibra ótica pode emitir laser ou luz infravermelha que pode causar danos a sua vista. Nunca olhe para dentro da fibra ótica ou da porta do conector. Tenha sempre em mente que os cabos de fibra ótica estão ligados a uma fonte de luz.

Warning:

AVVISO

Rischio di ustioni agli occhi dovute al laser Le apparecchiature con fibre ottiche possono emettere raggi laser o infrarossi in grado di provocare ferite agli occhi. Non guardare mai all'interno di una porta di connessione o una fibra ottica. Tenere sempre presente che i cavi a fibra ottica sono collegati a una sorgente luminosa.

Chapter 5: Small form factor pluggable transceivers

This chapter describes how to select and install small form factor pluggable (SFP) transceivers.

Use an SFP to connect a device motherboard to a fiber optic or unshielded twisted pair network cable. The SFPs described in this chapter provide Ethernet at 1 gigabit per second (Gb/s).

The Avaya VSP 4000 supports SFPs on fiber ports 47 and 48.

Selecting an SFP

Use an SFP transceiver to connect a device motherboard to a fiber optic or unshielded twisted pair network cable. Select the appropriate transceiver to provide the required reach.

Procedure steps

1. Determine the required reach.

   Depending on the product, SFPs are available for cable distances of up to 100 meters (m), 550 m, 10 kilometers (km), 40 km, 70 km, and 120 km.

2. Determine the required media and connector type.

   You need fiber optic cable for a reach over 100 m.

   Possible media include CAT5, single mode fiber, and multimode fiber. Possible connectors include Lucent connector (LC), MT-RJ, and RJ-45.

3. If the media is optical fiber, determine wavelength restrictions or requirements.

   To expand available bandwidth on a common optical fiber, use Coarse Wavelength Division Multiplexing (CWDM) SFPs.

4. Determine if you need digital diagnostic monitoring (DDM).

   Not all SFPs or products support DDM.

5. Use the following job aids to determine the appropriate SFP for your application.

Job aid

SFPs are hot-swappable input and output enhancement components designed for use with Avaya products to allow gigabit Ethernet ports to link with other gigabit Ethernet ports over various media types.

The system also supports CWDM SFPs. CWDM technology consolidates multiple optical channels on a common optical fiber. CWDM uses multiple wavelengths to expand available bandwidth.

CWDM SFPs support high speed data communications for Metropolitan Area Networks (MAN). The system uses a grid of eight CWDM optical wavelengths in both ring and point-to-point configurations. All components are color-coded by wavelength.

Important:

The attainable cable length can vary depending on the quality of the fiber optic cable used.

The following table describes the SFPs and SFP+s including the reach provided by various SFPs. This table is informational only—not all Avaya Ethernet switching and routing products support all the SFPs listed here.

Table 1: Compatible SFPs

Hardware	Description	Part number
1000BASE-T (RJ-45) SFP	Gigabit Ethernet, RJ-45 connector	AA1419043-E6
1000BASE-SX (LC) DDI	850 nm, Gigabit Ethernet, duplex LC connector	AA1419048-E6
1000BASE-LX (LC) DDI	1310 nm, Gigabit Ethernet, duplex LC connector	AA1419049-E6
1000BASE-XD DDI	1310 nm, Gigabit Ethernet, duplex LC connector	AA1419050-E6
	1550 nm, Gigabit Ethernet, duplex LC connector	AA1419051-E6
1000BASE-ZX DDI	1550 nm, Gigabit Ethernet, duplex LC connector	AA1419052-E6
1000BASE-XD CWDM (LC)	1470 nm to 1610 nm, up to 40 km	AA1419053-E6 to AA1419060–E6
1000BASE-ZX CWDM (LC)	1470 nm to 1610 nm, up to 70 km	AA1419061-E6 to AA1419068-E6
1000BASE-BX10 DDI SFP	1310 nm, single fiber LC, up to 10 km	AA1419069-E6
1000BASE-BX10 DDI SFP	1490 nm, single fiber LC, up to 10 km	AA1419070-E6

Hardware	Description	Part number
1000BASE-EX DDI SFP	1550 nm, up to 120 km	AA1419071-E6
1000BASE-BX40 bidirectional SFP	1310 nm, single fiber LC, up to 40 km	AA1419076–E6
1000BASE-BX40 bidirectional SFP	1490 nm, single fiber LC, up to 40 km	AA1419077–E6
100BASE-FX SFP	1310 nm, LC connector	AA1419074-E6

Important:

Avaya recommends the use of Avaya branded SFP transceivers as they have been through extensive qualification and testing. Avaya will not be responsible for issues related to non-Avaya branded SFP transceivers.

For more information about SPF specifications, see SFP specifications on page 43.

Installing an SFP

Install an SFP to provide an interface between the switch and the network cable.

The installation of an SFP takes about three minutes.

For translations of the following messages, see Product safety warnings and information on page 25.

Prerequisites

- Verify that the SFP is the correct model for your network configuration.
- Before you install the optical connector, ensure it is clean.

Danger:

Risk of eye injury by laser

Fiber optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to a light source.

Electrostatic alert:

Risk of equipment damage

To prevent damage from electrostatic discharge, always wear an antistatic wrist strap connected to an ESD jack.

Warning:

Risk of equipment damage

Only trained personnel can install this product.

Procedure steps

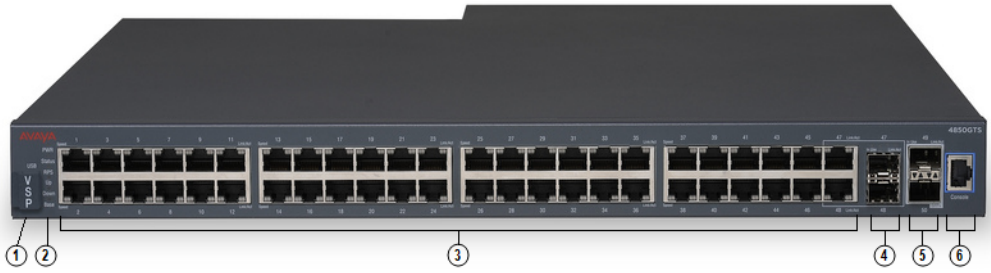
1. Remove the SFP from its protective packaging.
2. Grasp the SFP between your thumb and forefinger.
3. Insert the device into one of the available SFP slots on the device.

   Warning:

   Risk of equipment damage

   SFPs are keyed to prevent incorrect insertion. If the SFP resists pressure, do not force it; turn it over, and reinsert it.

   Apply a light pressure to the device until it clicks and locks into position.

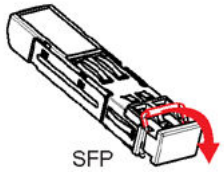


   1. VSP 4000 USB cover
   2. Switch LEDs
   3. 10/100/1000 PoE+ ports (LEDs above ports)
   4. Combo port SFP slots. Supports Avaya 1G SFPs and 100Base low speed SFPs.
   5. SFP+ slots. Supports Avaya 1G SFPs and 10G SFP+s.
   6. Console Port
4. Remove the dust cover from the optical bore and insert the fiber optic connector.

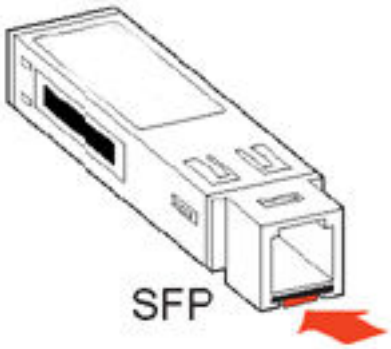
Job aid

Depending on the transceiver manufacturer, your SFP transceiver can have various types of locking and extractor mechanisms.

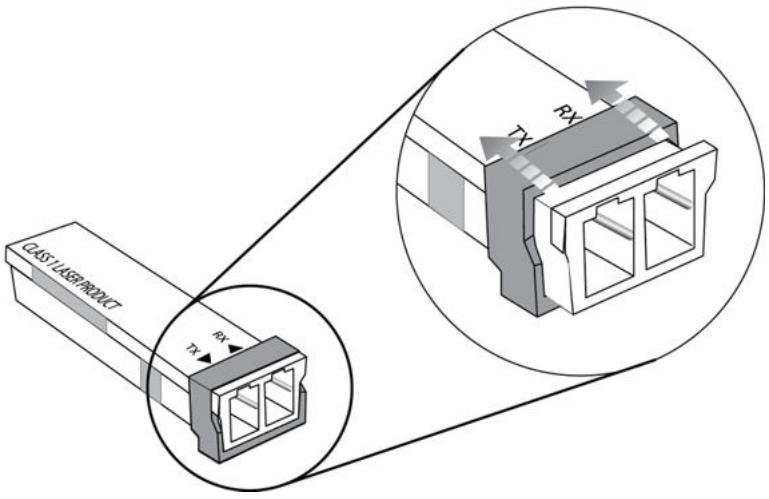
The following figures shows a typical mechanisms used on SFP transceivers. Other locking and extractor mechanisms exist, although they are not shown here. In the following figure, the SFP still has the bore plug installed. Pull the bail to release the device.



The following figure shows the 1000BASE-SX MT-RJ SFP. Push the tab to release the device.



The following figure shows the wrap-around latch-type extraction mechanism. To remove the device, push the collar towards the module.



Removing an SFP

Remove an SFP to replace it or to commission it elsewhere.

Prerequisites

- Wear an antistatic wrist strap.

Danger:

Risk of eye injury by laser

Fiber optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to a light source.

Electrostatic alert:

Risk of equipment damage

To prevent damage from electrostatic discharge, always wear an antistatic wrist strap connected to an ESD jack.

Procedure steps

1. Disconnect the network fiber optic cable from the SFP connector.
2. Depending on your SFP model, there are different locking mechanisms to release the SFP transceiver. The following are some examples:
   - Wrap-around latch-type: To remove the device, push the collar towards the module, and then pull to extract the module.
   - Bail latch: Pull the swing-down latch handle to the fully lowered position, and hold the handle to extract the module.
3. Slide the SFP out of the module SFP slot.

   If the SFP does not slide easily from the module slot, use a gentle side-to-side rocking motion while firmly pulling the SFP from the slot.
4. Affix dust covers over the fiber optic bore and connector.
5. Store the SFP in a safe place until needed.

Important:

If you discard the SFP, be sure to dispose of it according to all national laws and regulations.

Chapter 6: Small form factor pluggable plus transceivers

This chapter describes how to select and install small form factor pluggable plus (SFP+) transceivers.

Use an SFP+ transceiver to connect a device motherboard to fiber optic or direct attached cables. SFP+ transceivers are similar to SFP transceivers in physical appearance but SFP+ transceivers support 10 gigabit per second (Gb/s) connections. SFP+ transceivers support 10 Gb/s connections, but are not compatible devices.

The Avaya VSP 4000 supports SFP+ transceivers on fiber ports 49 and 50.

Important:

Avaya recommends the use of Avaya branded SFP and SFP+ transceivers as they have been through extensive qualification and testing. Avaya will not be responsible for issues related to non-Avaya branded SFP and SFP+ transceivers.

Selecting an SFP+

About this task

Use an SFP+ transceiver to interface a device motherboard to a fiber optic cable. Select the appropriate transceiver to provide the required reach.

Procedure

1. Determine the required reach.

   Depending on the product, you can obtain SFP+s for cable distances of up to 15 meters (m), 300 m, 10 kilometers (km), and 40 km.
2. Determine wavelength restrictions or requirements.
3. Use the following job aid to determine the appropriate SFP+ for your application.

Job aid

SFP+ transceivers are hot-swappable input and output enhancement components that allow 10 gigabit connections.

All Avaya SFP+ transceivers use Lucent connectors (LC) to provide precision keying and low interface losses.

The following table lists and describes the Avaya SFP+ models.

Table 2: Compatible SFP+s

Hardware	Description	Part number
10GBASE-LR/LW SFP+	1310 nm SMF with a range up to 10 km	AA1403011-E6
10GBASE-ER/EW SFP+	1550 nm SMF with a range up to 40 km	AA1403013-E6
10GBASE-SR/SW SFP+	850 nm with a range up to 300 m	AA1403015-E6
10GBASE ZR/ZW SFP+	1550 nm 70km SMF	AA1403016-E6
10GBASE-ER CWDM SFP +	1470 to 1610 nm with a range up to 40 km	AA1403153-E6 to AA1403160-E6
10GBASE-LRM SFP+	220 m, 1260 to 1355 nm; 1310 nm nominal MMF	AA1403017-E6
10GBase-CX	4-pair twinaxial copper cable that plugs into the SFP+ socket and connects two 10 Gb ports. The supported lengths are 3 m, 5 m, and 10 m.	AA1403018-E6 to AA1403020-E6

Important:

Avaya recommends the use of Avaya branded SFP+ transceivers as they have been through extensive qualification and testing. Avaya will not be responsible for issues related to non-Avaya branded SFP+ transceivers.

For more information about SFP+ specifications, see SFP+ specifications on page 55.

Installing an SFP+

Before you begin

Important:

Do not install an SFP+ transceiver in an SFP slot. The two transceivers look the same but function differently.

- Verify that the SFP+ is the correct model for your network configuration.
- Before you install the optical connector, ensure it is clean.

Danger:

Risk of eye injury by laser

Fiber optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables connect to a light source.

Electrostatic alert:

Risk of equipment damage

To prevent damage from electrostatic discharge, always wear an antistatic wrist strap connected to an ESD jack.

Warning:

Risk of equipment damage

Only trained personnel can install this product.

Warning:

Risk of equipment damage

SFP+ transceivers are keyed to prevent incorrect insertion. If the SFP+ resists pressure, do not force it; turn it over, and reinsert it.

About this task

Install an SFP+ to provide a 10 Gb Ethernet interface between the device and other network devices.

Installing an SFP+ takes approximately three minutes.

Procedure

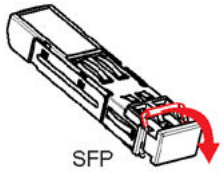
1. Remove the SFP+ transceiver from its protective packaging.
2. Grasp the SFP+ transceiver between your thumb and forefinger.
3. Insert the SFP+ transceiver into an SFP+ slot on the switch.

   Apply a light pressure to the SFP+ transceiver until the device clicks and locks into position.
4. Remove the dust cover from the SFP+ optical bores and insert the fiber optic cable.

Job aid

Depending on the transceiver manufacturer, the SFP+ transceiver uses bail-latch type of locking and extractor mechanism.

The following figure shows typical mechanism used on SFP+ transceivers; other locking and extractor mechanisms exist. SFP+ transceivers are similar to SFPs in physical appearance. In the following figure, the SFP+ uses the bore plug. Pull the bail to release the device.



Removing an SFP+

About this task

Remove an SFP+ transceiver to replace it or to commission it elsewhere.

Danger:

Risk of eye injury by laser

Fiber optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables connect to a light source.

Electrostatic alert:

Risk of equipment damage

To prevent damage from electrostatic discharge, always wear an antistatic wrist strap connected to an ESD jack.

Procedure

1. Disconnect the network fiber optic cable from the SFP+ connector.
2. Depending on your SFP+ model, there are different locking mechanisms to release the SFP+ transceiver. The following are some examples:
   - Wrap-around latch-type: To remove the device, push the collar towards the module, and then pull to extract the module.

- Bail latch: Pull the swing-down latch handle to the fully lowered position, and hold the handle to extract the module.

3. Slide the SFP+ out of the module SFP+ slot.

   If the SFP+ does not slide easily from the module slot, use a gentle side-to-side rocking motion while firmly pulling the SFP+ from the slot.

4. Affix dust covers over the fiber optic bore and connector.
5. Store the SFP+ transceiver in a safe place until needed.

Important:

If you discard the SFP+ transceiver, dispose of it according to all national laws and regulations.

Chapter 7: SFP specifications

This chapter provides technical specifications for the supported small form factor pluggable (SFP) models. Use this information to aid in proper network design.

The specifications in this chapter meet or exceed those specified in the applicable IEEE standards, where they exist.

In these specifications, unless otherwise noted, receiver sensitivity is the minimum average input optical power for which the receiver is guaranteed to meet the bit error rate (BER) of 10^{-12}.

SFP labels

The Avaya label on a typical SFP contains an Avaya serial number, a bar code, a manufacturer code, an interface type, and a part number.

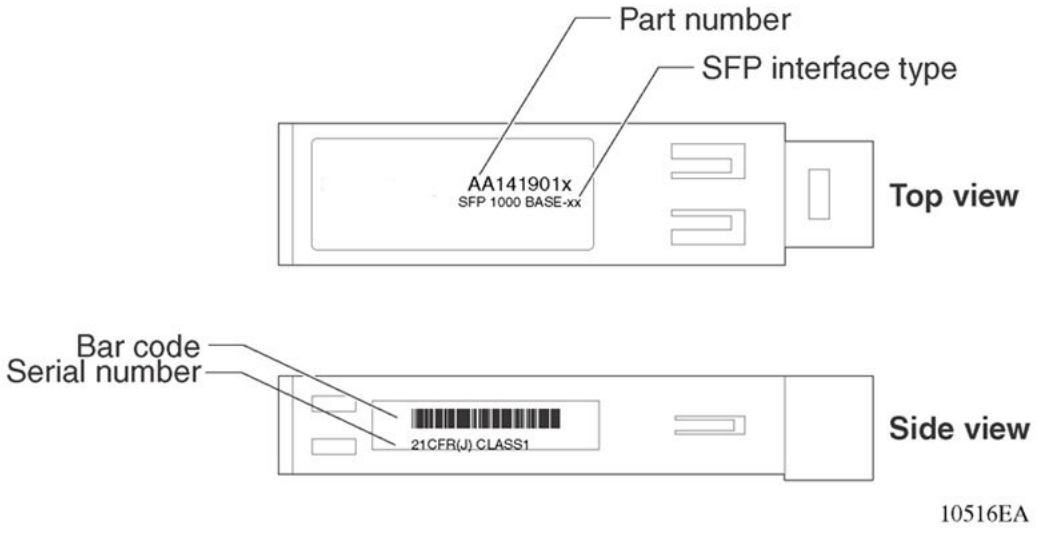


Figure 1: SFP label

General SFP specifications

The following table describes general SFP specifications.

Table 3: General SFP specifications

Parameter	Description
Dimensions (H x W x D)	13.4 x 8.50 x 56.4 millimeters (mm) 0.53 x 0.33 x 2.22 inches (in.) unless otherwise stated
Operating temperature	– 5 to 85C for RoHS -E6 models
Storage temperature	– 40 to 85C
Maximum supply current	300 mA unless otherwise stated
Maximum power consumption	1.0 W unless otherwise stated

1000BASE-T (RJ-45) SFP specifications

The 1000BASE-T (RJ-45) SFP provides gigabit Ethernet connectivity using a single eight-pin RJ-45 connector. The 1000BASE-T (RJ-45) SFP only operates at 1 gigabit per second (1 Gb/s) and does not support 100BASE-T or 10BASE-T interfaces. The part number for this model is AA1419043-E6.

Important:

Avaya recommends setting all 1000BaseT ports to auto-negotiate in accordance with the IEEE 802.3ab standard.

The maximum current requirement of the SFP is 375 milliamperes (mA) at 5 volts (V).

The following table describes the 1000BASE-T (RJ-45) SFP specifications.

Table 4: IEEE 802.3z 1000BASE-T (RJ-45) SFP specifications

Parameter	Specifications
Standards	IEEE 802.3z, IEEE 802.3ab
Connectors	RJ-45
Cabling	CAT5E or better UTP
Distance	Up to 100 m

1000BASE-SX (LC) DDI SFP specifications

The following table describes the 1000BASE-SX (LC) DDI SFP, which has a reach of up to 550 m using 50 µm MMF, and of 275 m using 62.5 µm MMF. This SFP operates at 850 nm. The part number of this SFP is AA1419048-E6.

Table 5: 1000BASE-SX (LC) DDI SFP (550 m) specifications

Parameter	Specifications
Maximum electrical power consumption	1 watt (W)
Connector	Duplex LC
Cabling	MMF
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Link optical power budget	7.5 dB
Transmitter characteristics	
Launch power	– 9.5 to -4.0 dBm
Receiver characteristics	
Receiver sensitivity	– 17 dBm
Maximum receiver power	0 dBm

1000BASE-LX (LC) DDI SFP specifications

This SFP provides 1000BASE–LX gigabit Ethernet connectivity at 1310 nanometers (nm) using single mode or multimode optical fiber. The part number of this SFP is AA1419049-E6.

Table 6: 1000BASE-LX (LC) DDI SFP specifications

Parameter	Specifications
Maximum electrical power consumption	1.0 watt (W)
Connectors	Duplex LC

Parameter	Specifications
Cabling	• 50 micrometer (µm) multimode fiber (MMF) • 62.5 µm multimode fiber • 9 µm single mode fiber (SMF)
Distance	• Up to 550 meters (m) using MMF • Up to 10 kilometers (km) using SMF
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Link optical power budget	9.5 dB
Transmitter characteristics	
Launch power	– 9.5 to -3.0 dBm
Receiver characteristics	
Receiver sensitivity	– 19.0 dBm
Maximum receiver power	– 3.0 dBm

1000BASE-XD DDI 1310 nm SFP specifications

The following table describes the 1000BASE-XD DDI SFP. This SFP operates at 1310 nm and has a reach of up to 40 km. The part number is AA1419050-E6.

Table 7: 1000BASE-XD DDI 1310 nm SFP specifications

Parameter	Specifications
Maximum electrical power consumption	1.0 W
Connectors	Duplex LC
Cabling	SMF, 9 µm
Data rate	1.0 Gb/s
Line rate (8B/10B) code	1.25 Gb/s
Link optical power budget	18 dB
Transmitter characteristics	
Launch power	– 4.5 to 0 dBm
Receiver characteristics	
Receiver sensitivity	– 22.5 dBm

Parameter	Specifications
Maximum receiver power	0 dBm

1000BASE-XD DDI 1550 nm SFP specifications

The following table describes the 1000BASE-XD DDI SFP. This SFP operates at 1550 nm and has a reach of up to 40 km. The part number is AA1419051-E6.

Warning:

Risk of equipment damage

To prevent damage to the optical receiver, ensure that at least 3 dB of attenuation is present between the transmit and receive ports.

Table 8: 1000BASE-XD DDI 1550 nm SFP specifications

Parameter	Specification
Maximum electrical power consumption	1.0 W
Connectors	Duplex LC
Cabling	SMF, 9 µm
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Link optical power budget	22 dB
Maximum dispersion power penalty	2 dB at 40 km
Transmitter characteristics	
Launch power	– 2.0 to 3.0 dBm
Receiver characteristics	
Receiver sensitivity	– 24 dBm
Maximum receiver power	0 dBm

1000BASE-ZX DDI SFP specifications

The following table describes the 1000BASE-ZX DDI SFP. This SFP operates at 1550 nm and has a reach of up to 70 km. The part number is AA1419052-E6.

Warning:

Risk of equipment damage

To prevent damage to the optical receiver, ensure that at least 5 dB of attenuation is present between the transmit and receive ports.

Table 9: 1000BASE-ZX DDI 1550 nm SFP specifications

Parameter	Specifications
Maximum electrical power consumption	1.0 W
Connectors	Duplex LC
Cabling	SMF, 9 µm
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Link optical power budget	24 dB
Maximum dispersion power penalty	2 dB at 70 km
Transmitter characteristics	
Launch power	0 to 5 dBm
Receiver characteristics	
Receiver sensitivity	– 24 dBm
Maximum receiver power	– 0 dBm

1000BASE-XD CWDM (LC) SFP specifications

The following table describes specifications for 1000BASE-XD CWDM (LC) SFPs numbered AA1419053-E6 to AA1419060-E6.

Warning:

Risk of equipment damage

To prevent damage to the optical receiver, ensure that at least 4 dB of attenuation is present between the transmit and receive ports.

Table 10: 1000BASE-XD CWDM (LC) SFP (40 km) specifications

Parameter	Specifications
Maximum electrical power consumption	1.0 W

Parameter	Specifications
Connectors	Duplex LC
Cabling	SMF, 9 µm
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Link optical power budget	17 dB
Maximum dispersion power penalty	1 dB at 40 km
Transmitter characteristics	
Launch power	– 4.0 to 1.0 dBm
Receiver characteristics	
Receiver sensitivity	– 21 dBm
Maximum receiver power	– 3.0 dBm

1000BASE-ZX CWDM (LC) SFP specifications

The following table describes specifications for CWDM SFPs numbered AA1419061-E6 to AA1419068-E6.

Warning:

Risk of equipment damage

To prevent damage to the optical receiver, ensure that at least 8 dB of attenuation is present between the transmit and receive ports.

Table 11: 1000BASE-ZX CWDM (LC) SFP (70 km) specifications

Parameter	Specifications
Maximum electrical power consumption	1.0 W
Connectors	Duplex LC
Cabling	SMF, 9 µm
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Link optical power budget	24 dB
Maximum dispersion power penalty	2 dB at 70 km
Transmitter characteristics	

Parameter	Specifications
Launch power	0 to 5.0 dBm
Receiver characteristics	
Receiver sensitivity	– 24 dBm
Maximum receiver power	– 3.0 dBm

1000BASE-BX10 DDI SFP specifications

The 1000BASE-BX bidirectional SFPs (part numbers AA1419069-E6 and AA1419070-E6) provide gigabit Ethernet connectivity over a single fiber.

The following figure shows an example of a 1000BASE-BX10 SFP pair. The appearance of the connector can vary in shape and latch color.

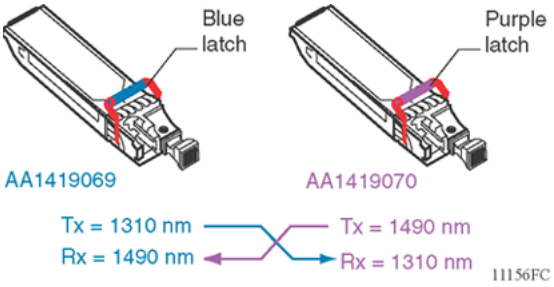


Figure 2: 1000BASE-BX

As shown in the previous figure, the transmit (Tx) and receive (Rx) paths share the same fiber by using two different wavelengths. One model transmits at 1310 nm and receives at 1490 nm, while the mating model transmits at 1490 nm and receives at 1310 nm. You can only connect a mating pair.

You can use 1000BASE-BX SFPs to double the number of your fiber links. For example, if you install 20 fiber pairs with 20 conventional ports connected, you can use 1000BASE-BX SFPs to expand to 40 ports, using the same fiber.

The long wavelength optical transceivers used in these models provide variable distance ranges using single mode fiber optic cabling.

The following table describes standards, connectors, cabling, and distances for the 1000BASE-BX SFP.

Table 12: IEEE 802.3ah 1000BASE-BX10 SFP specifications

Parameter	Specifications
Connectors	Single-fiber LC

Parameter	Specifications
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Distance	Up to 10 km
Wavelength	1310 nm and 1490 nm
Link optical power budget	11.0 dB
Maximum transmitter and dispersion power penalty	3.3 dB
Transmitter characteristics	
Maximum launch power	– 3.0 dBm
Minimum launch power	– 9.0 dBm
Receiver characteristics	
Maximum receiver sensitivity	– 19.5 dBm
Maximum input power (maximum average receive power)	– 3.0 dBm

1000BASE-EX DDI SFP specifications

The following table describes the 1000BASE-EX DDI SFP. This SFP operates at 1550 nm and has a reach of up to 120 km. The part number of this SFP is AA1419071-E6.

Warning:

Risk of equipment damage

To prevent damage to the optical receiver, ensure that at least 14 dB of attenuation is present between the transmit and receive ports.

To attain the BER of 10^{-12}, the minimum attenuation between the transmit and receive ports is 15 dB.

Table 13: 1000BASE-EX DDI SFP specifications

Parameter	Specifications
Maximum electrical power consumption	1.2 W
Connectors	Duplex LC
Cabling	SMF, 9 µm
Data rate	1.0 Gb/s

Parameter	Specifications
Line rate (8B/10B code)	1.25 Gb/s
Link optical power budget	30 dB
Maximum dispersion power penalty	2.0 dB at 120 km
Transmitter characteristics	
Launch power	0 to 5.0 dBm
Receiver characteristics	
Receiver sensitivity	– 30 dBm
Maximum receiver power	– 9.0 dBm

1000BASE-BX40 bidirectional SFP specifications

The 1000BASE-BX bidirectional SFPs (part numbers AA1419076-E6 and AA1419077-E6) provide gigabit Ethernet connectivity over a single fiber.

The transmit and receive paths share the same fiber by using two different wavelengths. One model transmits at 1310 nm and receives at 1490 nm, while the mating model transmits at 1490 nm and receives at 1310 nm. You can only connect a mating pair.

You can use 1000BASE-BX SFPs to double the number of your fiber links. For example, if you have 20 installed fiber pairs with 20 conventional ports connected, you can use 1000BASE-BX SFPs to expand to 40 ports, using the same fiber.

The long wavelength optical transceivers used in these models provide variable distance ranges using single mode fiber optic cabling.

The 1000BASE-BX SFPs (part numbers AA1419076-E6 and AA1419077-E6) can attain a reach of up to 40 km.

The following table describes standards, connectors, cabling, and distances for the 1000BASE-BX SFP.

Warning:

Risk of equipment damage

Connect 1000BASE-BX SFP AA1419076-E6 to 1000BASE-BX SFP AA1419077-E6 using a single mode fiber with at least 6 dB of attenuation. Damage can result if insufficient attenuation is provided or if the same 1000-BASE-BX SFPs are connected.

Table 14: IEEE 802.3ah 1000BASE-BX40 bidirectional SFP specifications

Parameter	Specifications
Connectors	Single-fiber LC
Data rate	1.0 Gb/s
Line rate (8B/10B code)	1.25 Gb/s
Distance	Up to 40 km with SMF
Wavelength	1310 nm and 1490 nm
Link optical power budget	20.0 dB
Maximum transmitter and dispersion power penalty	3.3 dB
Transmitter characteristics	
Maximum launch power	3.0 dBm
Minimum launch power	– 3.0 dBm
Receiver characteristics	
Maximum receiver sensitivity	– 23 dBm
Maximum input power (maximum average receive power)	– 3.0 dBm

100BASE-FX SFP specifications

The 100BASE-FX SFP provides 100 Mb/s Ethernet Carrier Sense Multiple Access with Collision Detection (CSMA-CD) connectivity using multimode optical fiber. The part number for this model is AA1419074-E6

You can use this device only in Avaya VSP 4000 SFP slots (47 and 48).

The following table describes the 100BASE-FX SFP specifications.

Table 15: 100BASE-FX SFP specifications

Parameter	Specifications
Maximum electrical power consumption	1.5 W
Connectors	Duplex LC (Lucent connector)
Cabling	• 62.5 µm MMF optic cable • 50 µm MMF optic cable

Parameter	Specifications
Distance	• Up to 2 km using 500 MHz-km MMF optic cable
Wavelength	1310 nm
Link optical power budget	10 dB
Transmitter characteristics	
Maximum launch power	– 14 dBm
Minimum launch power	– 23.5 to -20 dBm
Receiver characteristics	
Receiver sensitivity	– 33.5 dBm
Maximum input power	—

Chapter 8: SFP+ specifications

This section provides technical specifications for the supported 10 gigabit SFP+ models. Use these specifications to aid in network design.

The specifications in this section are a subset of the IEEE 802.3ae, 802.3aq, and 802.3ak specifications. For more information, see these standards documents. All Avaya SFP+ transceivers meet or exceed these standards.

The Avaya VSP 4000 supports SFP+ transceivers on fiber ports 49 and 50.

Important:

Avaya recommends that you only use Avaya qualified transceivers. If you do choose to use other vendor transceivers, Avaya does not support them.

SFP+ labels

The typical Avaya SFP+ has a label on the top and bottom or side of the transceiver. The following figures show example labels. Avaya does use alternate labels, depending on the size of the device and space available for label information.

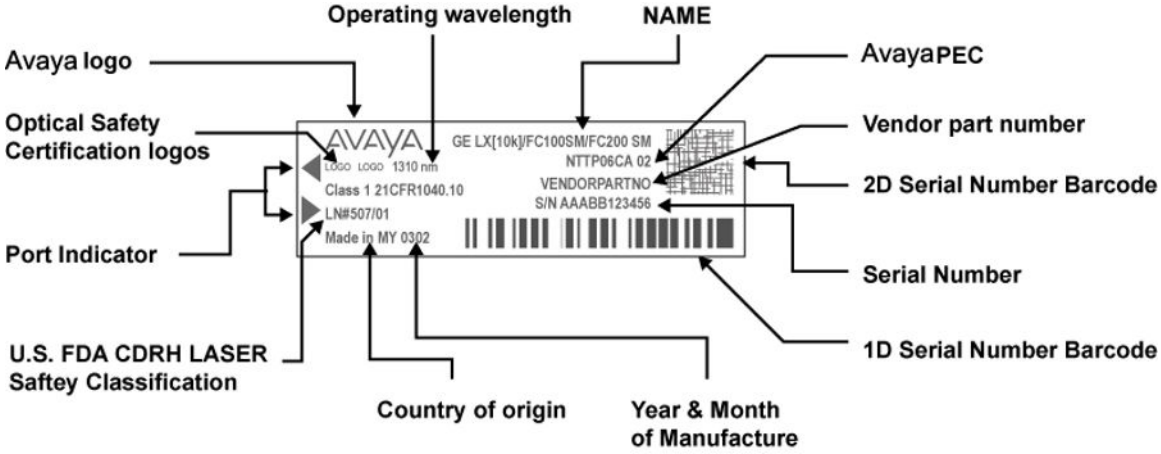


Figure 3: SFP+ top label

Figure 4: SFP+ bottom label

General SFP+ specifications

The following table describes general SFP+ specifications.

Table 16: General SFP+ specifications

Parameter	Specifications
Dimensions (H x W x D)	13.4 x 8.50 x 56.4 millimeters (mm) 0.53 x 0.33 x 2.22 inches (in.) unless otherwise stated
Connectors	LC ultra physical contact (UPC)
Storage temperature	–40 to 85C
Operating temperature	0 to 70 ºC for RoHS -E6 models

SFP+ transceiver specifications

The following sections provide specifications for supported SFP+ transceivers.

10GBASE-LR/LW SFP+ specifications

The 10GBASE-LR/LW SFP+ provides 10 GbE or OC-192 service at a nominal wavelength of 1310 nm. This SFP+ can attain link lengths of up to 10 km.

The following table lists the transmitter and receiver specifications for the 10GBASE-LR/LW SFP+. The part number of this SFP+ is AA1403011-E6.

For more information about the 10GBASE-LR/LW SFP+, including test and measurement information, see the IEEE 802.3ae standard.

Table 17: IEEE 802.3ae 10GBASE-LR/LW SFP+ specifications

Parameter	Specifications
Center wavelength range	1260 to 1355 nm; 1310 nm nominal
Distance	Up to 10 km
Link optical power budget	9.4 dB
Maximum transmitter and dispersion penalty	3.2 dB at 10 km
Transmitter characteristics	
Line rate (nominal)	10GBASE-LR/LW 10.3125 Gb/s ±100 ppm (10 GbE)
Average launch power	– 8.2 to 0.5 dBm
Minimum side mode suppression ratio	30 dB
Minimum launch power in OMA minus transmission and dispersion penalty (TDP)	– 6.2 dBm
Minimum optical modulation amplitude	– 5.2 dBm
Maximum average launch power of OFF transmitter[c]	– 30 dBm
Minimum extinction ratio	3.5 dB
$RIN_{12}OMA$ (maximum)	– 128 dB/Hz
Maximum optical return loss tolerance	-— 12 dB
Maximum transmitter reflectance	– 12 dB
Receiver characteristics	
Line rate (nominal)	10GBASE-LR/LW 10.3125 Gb/s ± 100 ppm (10 GbE)
Average receive power for BER 10^{-12}	– 14.4 dBm to 0.5 dBm
Maximum average receive power for damage	1.5 dBm
Maximum receiver sensitivity in OMA	– 12.6 dBm
Maximum receiver reflectance	– 12 dB
Stressed receiver sensitivity in OMA	– 10.3 dBm
Receiver electrical 3 dB upper cutoff frequency	12.3 GHz

Examples of an OFF transmitter are as follows: no power supplied to the PDM, laser shutdown for safety conditions, activation of a PMD_global_transmit_disable or other optional transmitter shut down condition

10GBASE-ER/EW SFP+ specifications

The following table lists the transmitter and receiver specifications for the 10GBASE-ER/EW SFP+. The reach for this SFP+ is up to 40 km at a wavelength of 1550 nm. The part number of this SFP+ is AA1403013-E6.

For more information about the 10GBASE-ER/EW SFP+, including test and measurement information and more specifications, see the IEEE 802.3ae standard.

Table 18: IEEE 802.3ae 10GBASE-ER/EW SFP+ specifications

Parameter	Specifications
Line rate (nominal)	10GBASE-ER/EW 10.3125 Gb/s ±100 ppm (10 GbE)
Center wavelength range	1530 to 1565 nm; nominal 1550 nm
Distance	Up to 40 km
Link optical power budget	15 dB
Transmitter and dispersion power penalty	3.0 dB at 40 km
Transmitter characteristics	
Launch power	–– 4.7 to 4.0 dBm
Minimum side mode suppression ratio	30 dB
Minimum launch power in OMA minus transmission and dispersion penalty (TDP)	– 2.1 dBm
Minimum optical modulation amplitude	– 1.7 dBm
Maximum average launch power of OFF transmitter	–– 30 dBm
Minimum extinction ratio	3.0 dB
Maximum $RIN_{12}OMA$	– 128 dB/Hz
Maximum optical return loss tolerance	– 21 dB
Receiver characteristics	
Average receive power for BER 10^{-12}	– 15.8 dBm to – 1.0 dBm
Maximum receive power for damage	4.0 dBm
Maximum receiver sensitivity in OMA	– 14.1 dBm
Maximum receiver reflectance	– 26 dB
Stressed receiver sensitivity in OMA	– 11.3 dBm

Parameter	Specifications
Receive electrical 3 dB upper cutoff frequency (maximum)	12.3 GHz

Examples of an OFF transmitter are as follows: no power supplied to the PDM, laser shutdown for safety conditions, activation of a PMD_global_transmit_disable or other optional transmitter shut down conditions.

10GBASE-SR/SW SFP+ specifications

The 10GBASE-SR/SW SFP+ provides 10 GbE service at 850 nm.

The following table lists the specifications for the 10GBASE-SR/SW SFP+. The part number of this SFP+ is AA1403015-E6.

For more information about the 10GBASE-SR/SW SFP+, including test and measurement information, see the IEEE 802.3ae standard.

Warning:

Risk of equipment damage

To prevent damage to the optical receiver, ensure that at least 1 dB of attenuation exists between the transmit and receive ports.

Table 19: IEEE 802.3ae 10GBASE-SR/SW SFP+ specifications

Parameter	Specifications
Data rate	10.0 Gb/s
Line rate (64B/66B code)	10.3125 gigabits per second (Gb/s) ± 100 parts per million (ppm)
Mean Time Between Failures (MTBF)	675 000 hours
Center wavelength range	840 to 860 nanometers (nm), nominal 850 nm
Distance	Using 62.5 µm MMF optic cable: • 160 MHz-km fiber: 2 to 26 m • 200 MHz-km fiber: 2 to 33 m Using 50 µm MMF optic cable: • 400 MHz-km fiber: 2 to 66 m • 500 MHz-km fiber: 2 to 82 m • 2000 MHz-km fiber: 2 to 300 m
Link optical power budget	7.3 dB

Parameter	Specifications
Maximum transmitter and dispersion penalty	3.9 dB at 300 m
Transmitter characteristics	
Root-mean-square spectral width	0.05 to 0.40 nm
Launch power	– 7.3 to – 1.0 deciBels referenced to 1 milliwatt (dBm)
Maximum average launch power of OFF transmitter	– 30 dBm
Minimum extinction ratio	3.0 dB
Maximum relative intensity noise $_{12}$OMA	– 128 dB per Hertz (dB/Hz)
Maximum optical return loss tolerance	– 12 dB
Receiver characteristics	
Average receive power for BER 10^{-12}	– 9.9 to – 1.0 dBm
Maximum average receive power for damage	0 dBm
Maximum receiver sensitivity in OMA	– 11.1 dBm
Maximum receiver reflectance	– 12 dB
Stressed receiver sensitivity in OMA	– 7.5 dBm
Receiver electrical 3 dB upper cutoff frequency	12.3 gigaHertz (GHz)

The stressed sensitivity values are for system level BER measurements, which include the effects of clock and data recovery (CDR) circuits. Avaya recommends that you allocate at least 0.4 dB additional margin if you make component level measurements without the effect of CDR circuits.

10GBASE-ZR/ZW SFP+ specifications

The following table lists the transmit and receive specifications for the 10GBASE-ZR/ZW SFP +. The reach for this SFP+ is up to 70 km* at a wavelength of 1550 nm. The part number of this SFP+ is AA1403016–E6.

Caution:

Risk of BER increase

For proper SFP+ operation, ensure that at least 11 dB of attenuation is present between the transmit and receive ports.

Table 20: 10GBASE-ZR/ZW SFP+ specifications

Parameter	Specifications
Line rate (nominal)	10GBASE-ZR 10.3125 Gb/s ±100 ppm (10 GbE)
Distance	Up to 70 km*
Link optical power budget	24 dB
Dispersion power penalty	3.0 dB at 70 km (G.652 fiber)
Transmitter characteristics	
Center wavelength range	1530 nm to 1565 nm, nominal 1550 nm
Side mode suppression ratio (minimum)	30 dB
Average launch power	0 to 4.0 dBm
Optical modulation amplitude (minimum)	+1.7 dBm
Average launch power of OFF transmitter (maximum)	-30 dBm
Extinction ratio (ER) (minimum)	8.2 dB
$RIN_{12}OMA$ (maximum)	-128 dB/Hz
Maximum transmitter reflectance	-12 dB
Receiver specifications	
Wavelength range	1280 to 1575 nm. Sensitivity specified for 1530 to 1565 nm.
Maximum receiver sensitivity (average power)	-24 dBm
Maximum receiver (average) power, BER 10^{-12}	-7.0 dBm
Receiver damage threshold (average power)	+5.0 dBm
Receiver reflectance (maximum)	-27 dB

* Achievable link distance is primarily dependent on cable plant insertion loss. 70 km is not possible in some situations.

10GBASE-ER CWDM SFP+ specifications

The following table lists the part numbers of the 10GBASE-ER CWDM SFP+ with corresponding wavelengths. The reach for this SFP+ is up to 40 km.

Table 21: Part number and center wavelength assignment

Part number	Center wavelength assignment
AA1403153-E6	1470 nm
AA1403154-E6	1490 nm
AA1403155-E6	1510 nm
AA1403156-E6	1530 nm
AA1403157-E6	1550 nm
AA1403158-E6	1570 nm
AA1403159-E6	1590 nm
AA1403160-E6	1610 nm

The following table lists the transmitter and receiver specifications for the 10GBASE-ER CWDM SFP+.

Table 22: 10GBASE-ER CWDM SFP+ specifications

Parameter	Specifications
Transmitter characteristics	
Optical Data Rate (nominal)	9.95 Gb/s to 10.313 Gb/s
Center wavelength	Nominal – 6.5 nm to nominal + 6.5 nm
Spectral width (rms at -20 dB)	1 nm
Side Mode Suppression ratio	30 dB
RIN	– 128 dB/Hz
Average launched power	– 0.2 dBm to 4 dBm
Average launched power, Tx OFF	– 30 dBm
Extinction ratio (minimum)	8.2 dB
Tx power, OMA (minimum)	+ 1.5 dBm
Tx power, OMA-TDP (minimum)	– 0.2 dBm
TDP at 800 ps dispersion (maximum)	2.8 dB

Parameter	Specifications
IEEE 10GBASE-ER eye mask margin	10%
Receiver characteristics	
Wavelength (requirement)	1450 nm to 1620 nm
Receiver sensitivity (unstressed), OMA	– 14.1 dBm, P_OMA
IEEE 10GBASE-ER Stressed Rx Sensitivity	– 11.3 dBm, P_OMA
Receiver overload	– 1 dBm, P_avg
Receiver reflectance	– 26 dB
Receiver damage threshold	+4 dBm

10GBASE-LRM SFP+ specifications

The 10GBASE-LRM SFP+ provides 10 GbE service at a wavelength of 1310 nm. This SFP+ can attain a reach of up to 220 m on 62.5 µm multimode fiber. This SFP+ provides built-in electronic dispersion compensation.

The following table lists the transmitter and receiver specifications for the 10GBASE-LRM SFP +. These parameters meet the IEEE 802.3aq-2006 standard. The part number of this SFP+ is AA1403017-E6.

In this table, the OMA, average launch power, and peak power specifications apply at TP2, after accounting for patch cord loss.

Table 23: IEEE 802.3aq 10GBASE-LRM SFP+ specifications

Parameter	Specifications
Data rate	10.0 Gb/s
Line rate (64B/66B code)	10.3125 Gb/s ± 100 ppm
Center wavelength range	1260 to 1355 nm; 1310 nm nominal
Distance	Up to 220 m
Link optical power budget	1.7 to 1.9 dB
Maximum transmitter waveform and dispersion penalty (TWDP)	4.7 dB
Transmitter characteristics	
Average launch power	– 6.5 to 0.5 dBm
Peak launch power	3 dBm
Root-mean-square spectral width	2.4 to 4 nm

Parameter	Specifications
Launch power in OMA	– 4.5 to 1.5 dBm
Maximum average launch power of OFF transmitter	– 30 dBm
Minimum extinction ratio	3.5 dB
Maximum relative intensity noise at OMA—$RIN_{12}OMA$	– 128 dB/Hz
Optical return loss tolerance (minimum)	– 20 dB
Receiver characteristics	
Maximum receive average power for damage	1.5 dBm
Receiver reflectance (maximum)	– 12 dB

For more information about the conditions used for the stressed receiver tests, and other information, see the IEEE 802.3aq standard.

The following table (from IEEE 802.3aq) describes the maximum channel insertion loss. The channel insertion loss includes both attenuation and connector loss (1.5 dB); therefore the maximum fiber attenuation is 0.2 to 0.4 dB.

Table 24: 10GBASE-LRM channel insertion loss and range

Fiber type (core diameter and OFL bandwidth)	Range	Maximum channel insertion loss
62.5 µm (FDDI grade) • 160 MHz-km at 850 nm • 500 MHz-km at 1300 nm	Up to 220 m	1.9 dB
62.5 µm (ISO/IEC OM1) • 200 MHz-km at 850 nm • 500 MHz-km at 1300 nm	Up to 220 m	1.9 dB
50 µm (ISO/IEC OM2) • 500 MHz-km at 850 nm • 500 MHz-km at 1300 nm	Up to 220 m	1.9 dB
50 µm • 400 MHz-km at 850 nm • 400 MHz-km at 1300 nm	Up to 100 m	1.7 dB
50 µm (ISO/IEC OM3)	Up to 220 m	1.9 dB

Fiber type (core diameter and OFL bandwidth)	Range	Maximum channel insertion loss
• 1500 MHz-km at 850 nm (includes laser launch bandwidth) • 500 MHz-km at 1300 nm (includes laser launch bandwidth)		

In the table, FDDI denotes Fiber Distributed Data Interface, ISO denotes International Standards Organization, IEC denotes International Electrotechnical Commission, and OFL denotes Over Filled Launch.

The following table uses the 802.3aq standard and specifies the measurement conditions for each fiber type.

Table 25: Launch conditions for each fiber type

Parameter	Minimum encircled flux	Notes
Optical launch for OM1 and FDDI-grade fiber	• 30% within 5 µm radius • 81% within 11 µm radius	Uses 62.5 µmmode conditioning patch cord
Optical launch for OM2 and 50 µm 400/400 fiber	• 30% within 5 µm radius • 81% within 11 µm radius	Uses 50 µmmode conditioning patch cord
Optical launch for OM3 and 50 µm fiber	• 30% within 5 µm radius • 81% within 11 µm radius	—

10GBASE-CX specifications

The 10GBASE-CX is a 4-pair twinaxial copper cable that plugs into the SFP+ socket and connects two 10 Gb ports. The reach for this cable is up to 15 m with a bit error rate (BER) better than 10^{-12}. The signaling speed for each lane is 3.125 GBd ± 100 ppm. The 10GBASE-CX is a lower cost alternative to the optical SFP+ devices.

For more information about the 10GBASE-CX, including test and measurement information and more specifications, see the IEEE 802.3ak standard. The following table identifies the part numbers for specific cable lengths.

Table 26: 10GBASE-CX cables

Cable length	Part number
3 meter	AA1403019-E6

Cable length	Part number
5 meter	AA1403020-E6
10 meter	AA1403018-E6