Vixel Corporation, 11911 North Creek Parkway South, Bothell, WA 98011

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CHAPTER 1 Introduction

Figure 1-1. *Vixel 1000 Fibre Channel Arbitrated Loop Hub (may be labeled "Vixel Rapport 1000")*

About This Guide

This guide is designed to provide the user with the necessary information to install the Vixel 1000 Fibre Channel Arbitrated Loop Hub and associated GigaBit Interface Converters (GBICs) for use in Fibre Channel Arbitrated Loop applications.

Features

The Vixel 1000 Fibre Channel Arbitrated Loop Hub has the following features:

- Seven user-configurable media interface ports (optical and/or copper) for best price performance and distance alternative.
- Plug and Play fault tolerance for online system configuration changes.
- Modular GBIC transceiver design allows users to utilize ports when needed.
- Cascadable - up to 127 active ports or support of multiple loop implementations.
- Simplified cable management for centralized storage management applications.
- Hot-pluggable GBIC for optimal investment and lowest cost solution.
- Half-rack (1U - 1 ¾") low profile hub packaging offers highest port density in single 1 unit height rack mount.
- Auto-sensing power-supply - supports 100 to 250 VAC and 50 or 60 Hz.

Description

The Vixel 1000 is designed as a seven-port central interconnect for Fibre Channel Arbitrated Loops following the ANSI FC-AL standard. Each Vixel 1000 port receives serial data from an attached node and retransmits the data out the next hub port to the next node attached in the loop (see Figure 1-2 on page 3). Each reception includes data regeneration (both signal timing and amplitude) supporting full distance optical and copper links.

Any loop node that is missing or is inoperative is detected by the Vixel 1000 and the data is automatically routed to the next operational port and attached node in the loop. LED indicators provide status information to service personnel to indicate whether the port is active or bypassed.

Each port requires a GBIC to connect to each attached node. The Vixel 1000 supports any combination of optical (short-wave or long-wave) or copper GBICs. The GBICs are "hot-pluggable" into the Vixel 1000 which allows host computers, servers and storage modules to be added to the arbitrated loop dynamically without requiring power removal from the Vixel 1000 or any connected devices. Removal of GBICs from a Vixel 1000 port causes the automatic bypass of that port. The remaining hub ports continue to operate normally with no degradation of system performance. Conversely, a GBIC plugged in the Vixel 1000 will be automatically inserted and become a node on the loop if valid Fibre Channel data is received from the device.

Data transfer within the Vixel 1000 is implemented in serial differential Positive Emitter Coupled Logic (PECL) AC coupled logic. Each Vixel 1000 port monitors the serial data input stream as well as the GBIC connected to it.

The following conditions will cause the Vixel 1000 to bypass a port:

- TX_FAULT: Detects a GBIC transmitter fault.
- RX_LOS: Detects a loss of received signal amplitude from the device

- MOD_DEF: Detects the absence of a GBIC.

The Vixel 1000 circuitry detects off-frequency data, excessive jitter or inadequate edge transition density on a per-port basis. The Vixel 1000 uses the standardized AMP™ SCA2 20-pin connector to implement hot-plugging. Surge currents, caused by hot-plugging, are minimized by slow-start circuitry and a pin sequencing procedure on the GBIC. Electrostatic Discharge (ESD) transients are minimized by means of sequenced connector contacts. The Vixel 1000 includes a universal power supply that can operate over the range of 100 to 250 VAC and 50 or 60 Hz.

Fibre Channel-Arbitrated Loop

The Fibre Channel-Arbitrated Loop (FC-AL) is an ANSI standard (X3T11) designed to provide shared bandwidth over low-cost media. Early adopters primarily use the SCSI protocol transported over Fibre Channel for distributed server and storage cluster applications. The Vixel 1000 is a central point of interconnect designed to maintain a fault-tolerant physical loop topology. The Vixel 1000 can be used to implement departmental configurations to extend the size of the FC-AL loop by cascading hub ports together. Typical departmental configurations may be required to cascade as many as 3 to 5 hubs together.

Vixel works closely with emerging industrial standards groups like ANSI X3T11 to contribute to the definition, design and support of new protocols, applications and products. Vixel is a member of the Fibre Channel Association (FCA), the Fibre Channel Loop Community (FCLC) and the ANSI X3T11 committee.

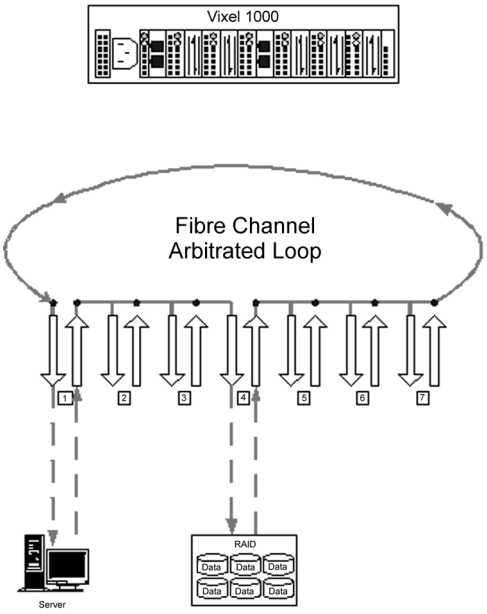


Figure 1-2. *Fibre Channel Arbitrated Loop*

Notes

- In Figure 1-2 on page 3, ports 1 & 4 have devices plugged in using OE1063SW optical GBICs while other ports are not currently connected.
- Internal switches determine input of data. If a GBIC is inserted in the hub and a valid CLOCK is derived by the GBIC, the receive path is from the receiver of the GBIC. If the GBIC slot is empty or if the GBIC has been bypassed, the receive path is from the internal bus.
- Data is always present at the transmitter of a port, whether or not a GBIC is installed.

Applicable Documentation

Fibre Channel-Arbitrated Loop (FC-AL) Rev. 4.5

Fibre Channel Physical and Signaling Interface (FC-PH)

Fibre Channel Physical and Signaling Interface -2 (FC-PH-2) Rev. 7.4

Fibre Channel Physical and Signaling Interface -3 (FC-PH-3) Rev. 9.0

CHAPTER 2 Vixel 1000 Hub Assembly

Shipping Contents

Note: The Optical and Copper GBICs and their associated cables do not come with the hub and must be ordered separately. To order, please call Vixel"s Sales Dept. at (425) 806-5509.

- Vixel 1000 Fibre Channel Arbitrated Loop Hub, 1ea.
- Power Cord, 1 ea.
- Self-adhesive pads for desktop installation, 4 ea.
- Installation Guide, 1 ea.

Desktop Installation

The Vixel 1000 is shipped with four self-adhesive rubber pads for desk-top installation. These rubber pads are designed to prevent surface damage.

To install the rubber pads:

1. Place the hub upside down so the case bottom is facing up.
2. Remove the wrapping and install one self-adhesive pad on each corner of the hub.

Feature Identification

The hub may be labeled as "Vixel Rapport 1000."

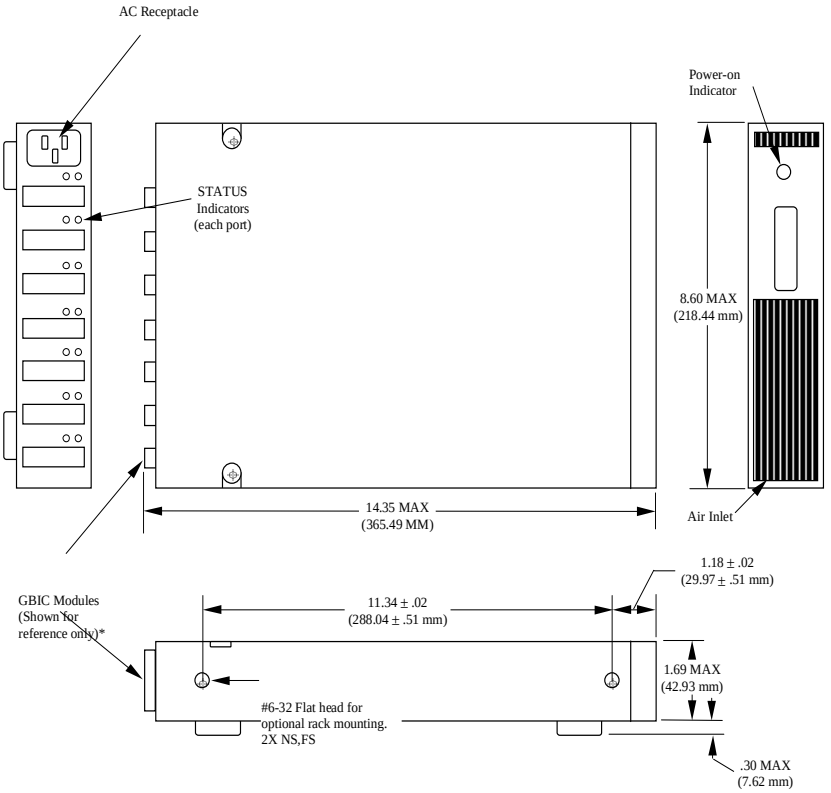


Figure 2-1. *Vixel 1000 Hub Standard Assembly*

CHAPTER 3

Installation and Configuration Changes

Introduction to Applications

The Vixel 1000 is designed to provide a centralized point of connectivity, to provide loop fault tolerance, and to simplify configuration management. Specifically designed for FC-AL applications, the hub provides considerable flexibility in configuring loops, segmenting them for performance or high-profile availability applications. The Vixel 1000's modular interface provides flexibility and is upgradable to all available Fibre Channel GBICs (GigaBit Interface Converter): short-wave, long-wave optical and copper.

Fibre Channel products that are commonly interconnected to the Vixel 1000 are Fibre Channel host bus adapters, FC-AL storage devices and/or FC-AL storage arrays. SCSI Initiators (workstations and servers) set up and initiate the transfer of

data to and from the storage device. SCSI targets are the storage devices that receive the requests made by the SCSI initiators. Initiators and targets represent individual nodes that are linked by the shared FC-AL.

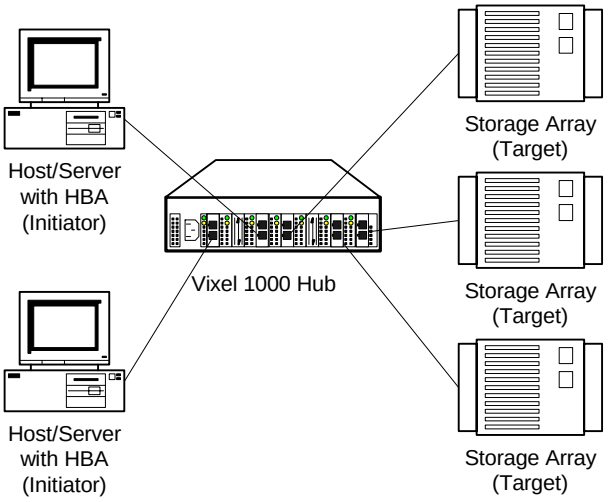


Figure 3-1. *Storage Applications Example*

In some circumstances, redundancy for loop fail-over protection requires the implementation of dual loops, as represented in Figure 3-2 below.

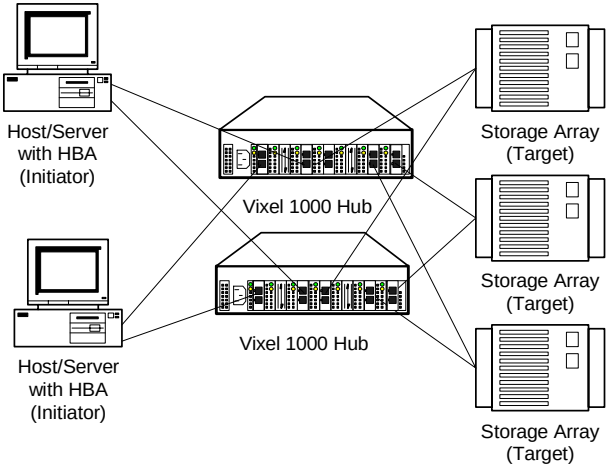


Figure 3-2. *Redundant Loop Applications Example*

Installation Procedure

IMPORTANT: Before installing the Vixel 1000, please see *Regulatory and Safety Information* on page 17.

The following procedure outlines the information necessary to initially set-up or make configuration changes to a FC-AL using the Vixel 1000.

The procedural steps are centered around:

1. Installing GigaBit Interface Converters (GBICs) within the hub and attaching the appropriate cable assemblies.
2. Making appropriate connections to the initiator and target nodes on the FC-AL.
3. Powering on, checking the hub ports, and ensuring proper loop initialization.

GigaBit Interface Converter (GBIC) Choices

The Vixel 1000 is designed with seven modular, gigabit-per-second user configurable interface ports. These seven ports are compliant with the GigaBit Interface Converter (GBIC) Specification developed under the mutual interest of Vixel Corporation, AMP Incorporated, Compaq Computers and Sun Microsystems.

GBICs are currently available in the following media types allowing the selection of the appropriate media for a particular application and/or topology.

Short-Wave Optical GBIC (OE1063SW)

- Uses dual SC fiber optic connectors
- Supports multimode 50 µm fiber – 2 meters/minimum, 500 meters/maximum
- Supports multimode 62.5 µm fiber – 2 meters/minimum, 175 meters/maximum
- Wavelength – 790 nm (typical, range between 770-860 nm)
- Non-OFC laser
- Compliant with Fibre Channel FC-PH-2 physical layer option 100-M5-SN-I

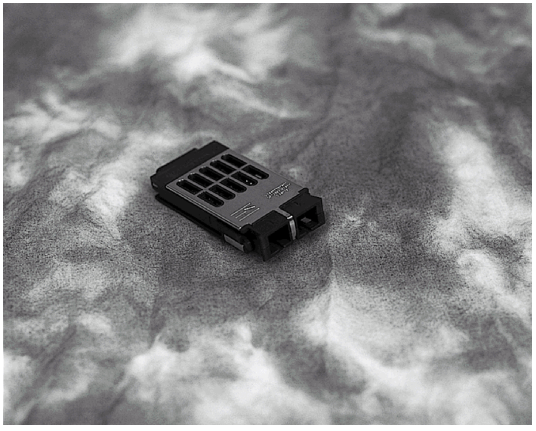


Figure 3-3. *Short-wave Optical GBIC*

Active Copper GBIC

- Uses AMP™ HSSDC (FC-PH-3 Style II) or Active DB-9 connector
- Inter-cabinet maximum length is 33 meters
- For lengths over 25 meters, use equalized cables (these cables contain special circuitry that prevents high-frequency loss and general signal degradation)

Figure 3-4. *Active Copper GBIC (with HSSDC Connector)*

Long-Wave Optical GBIC

- Uses dual SC fiber optic connectors
- Uses single-mode 9 µm fiber
- Fiber lengths – 2 meters/minimum, 10 kilometers/maximum
- Wavelength – 1310 nm (range between 1280-1330 nm)
- Non-OFC laser

Figure 3-5. *Long-wave Optical GBIC*

Gigabit Interface Converter (GBIC) Installation

The GigaBit Interface Converter (GBIC) can be inserted into any available port of the Vixel 1000.

WARNING: Optical GBICs emit invisible laser radiation. Do not stare into the transmitted beam.

Installation tips:

- The GBIC housing has an integral guide key that is designed to prevent improper insertion.
- Forcing the GBIC into the hub port may cause damage to the GBIC and/or the hub port.
- Use minimal pressure when inserting the GBIC into the Vixel 1000.
- GBICs are hot-pluggable, allowing for insertion or removal while the hub is still powered on.
- Insertion or removal of a GBIC will not affect the performance of the operational loop.
- The connection of the fiber optical (SC short-wave, long-wave) or copper (DB-9, HSSDC) cable to the GBIC module can be made before or after the GBIC is inserted into the Vixel 1000.
- A GBIC inserted without media attached will remain in the BYPASSED state. When media is attached to the GBIC and a valid receive signal is detected, the Vixel 1000 will allow the GBIC and the devices attached to join the loop.
- Unused ports, improperly seated GBICs, or GBICs that do not receive a valid input signal will remain in the BYPASS state and will not affect the operation of the Loop.

The following example (steps 1 and 2) shows the proper installation of GBICs and fiber-optic media.

Step One - Insert cables into GBIC.

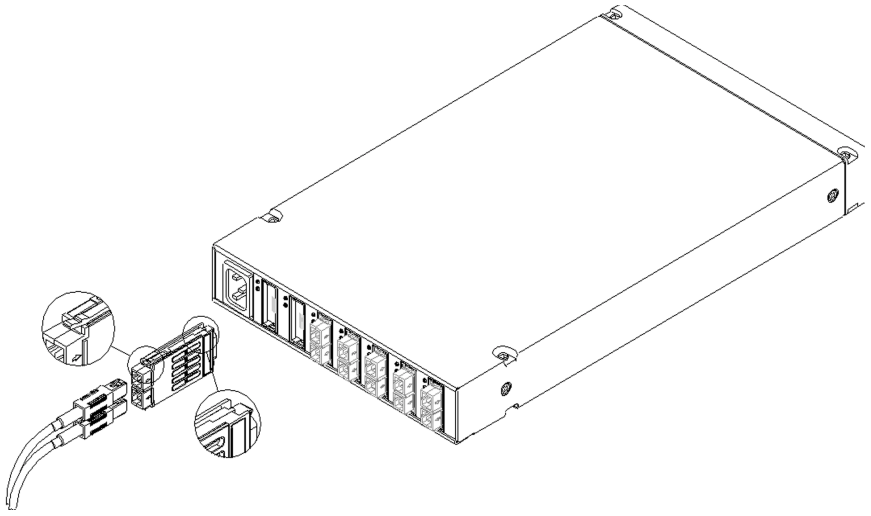


Figure 3-6. *GBIC Installation (Optical)*

Step Two - Insert GBIC into Vixel 1000 port.

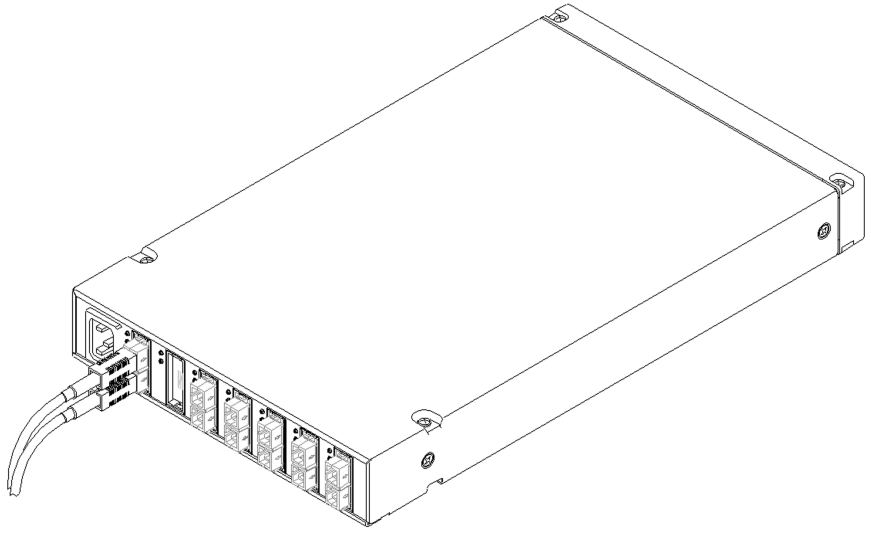


Figure 3-7. *Completed GBIC Installation (Optical)*

Gigabit Interface Converter (GBIC) Removal

To remove a GBIC from the hub port, simultaneously press inward the opposing tabs on either side of the GBIC at the external interface while slowly removing the module. It is optional for the user to remove the cable assembly attached to the GBIC either before or after removing the GBIC.

Attachment to Initiators and Targets

The cable assembly must be attached to the node or loop of nodes that the particular port is to support. An example of a host bus adapter with a GBIC attached is included here for reference.

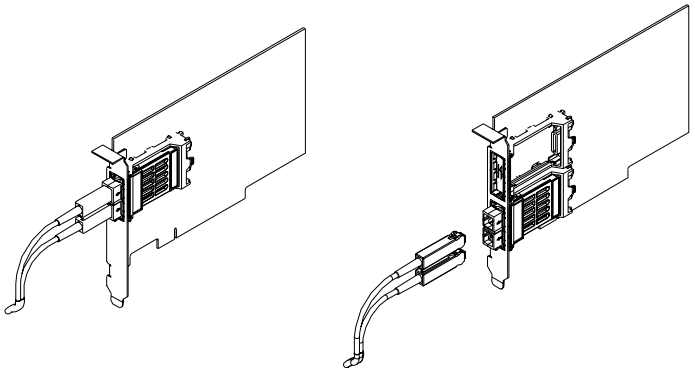


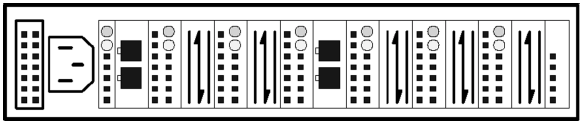
Figure 3-8. *Host Bus Adapter Examples (with Optical GBICs)*

Power Up Systems Check

Note: The green and amber LEDs must be read together. For additional assistance, please see "Port Status LEDs" on page 20.

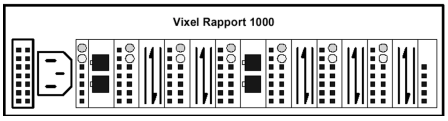
Once all appropriate cabling is installed, the loop should be operational. The Vixel 1000 Hub and attached workstations, servers and storage modules can be powered up in any sequence. However, some nodes may require that the hub be powered on first to insure proper loop initialization.

1. Power on the Vixel 1000 by plugging in the power cord.



2. Power on attached FC-AL compatible nodes.

3. Check the Device Active (Green) LEDs on the Vixel 1000 ports.



Device Active LED On indicates the presence and proper functionality of a GBIC.

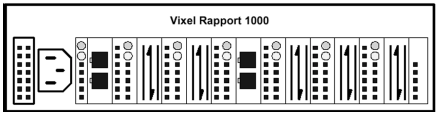
Device Active LED Off indicates a fault condition, which could be a GBIC transmitter fault, improperly seated GBIC, a non present GBIC or another failed device. The port will be in the bypass state, which precludes the port from participating in the loop. This is the normal status of operation for Vixel 1000 ports in which GBICs are not installed.

Note: Improper loop initialization could be the result of a defective or inoperative adapter card or device on the loop. Run adapter diagnostics with loopback connector to see if the adapter is working properly.

4. Loop Initialization

FC-AL compatible nodes must perform loop initialization procedures upon power-up in order to function properly on the loop. It is the responsibility of the Fibre Channel driver software on FC-AL nodes to perform loop initialization or re-initialization (depending on its prior state of operation).

5. Check the port Bypass (Amber) LEDs



Bypass LED On - If the Active (Green) LED of the port is off, the port is non-operational and the Bypass LED for the port will be on. Either loss of signal and/or poor signal integrity will leave the port in the bypass state, which precludes the port from participating in the FC-AL. This is the normal status condition when no GBIC is present in the port or the GBIC is present but not attached to a FC-AL node, or if it is only attached to a cable assembly with nothing attached at the opposite end. Replacing such a port (or replugging the same port twice) is considered to be a loop configuration change which should initiate the Loop Initialization Procedure by the attached device (Step 4).

Bypass LED Off indicates that the Vixel 1000 port and device are fully operational and actively participating in the loop, if the green LED is on.

6. Fully operational loop

The FC-AL should be fully operational at this point. However, it is appropriate to ensure that proper loop discovery has taken place and that all required devices are participating in the loop. Some host bus adapters may provide this level of functionality or it might be resident in the application software on the host operating system.

Redundant Fibre Channel-Arbitrated Loop Configurations

A dual loop configuration design is recommended for applications requiring loop redundancy for maximum uptime. A second, independent Vixel 1000 Hub is required for the redundant loop. Many host bus adapters and storage modules have dual ports to support dual loop configurations. Some host systems require a second host bus adapter for the redundant loop connection. See Figure 3-9 (below) for an example of redundant loop applications.

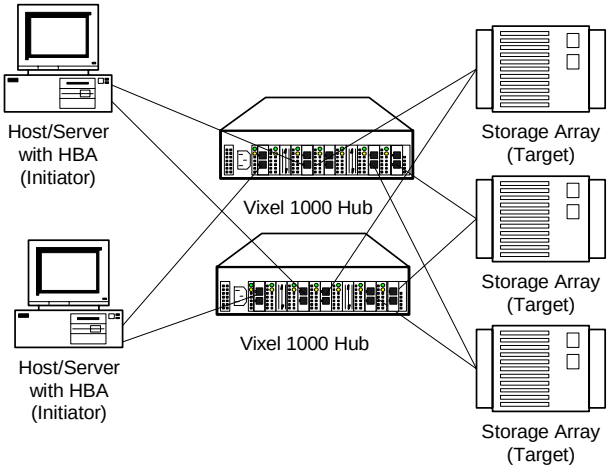


Figure 3-9. *Redundant Loop Applications Example*

CHAPTER 4 Technical Assistance

Troubleshooting

If you run into a problem while using the Vixel 1000, first try the following:

1. See "Problem Isolation" on page 19 for a list of typical causes.
2. See "Course of Action for Problem Resolution" on page 23 for a list of problems (shown by LED status) and recommended actions.
3. For further assistance, please call your authorized Vixel reseller.

Contacting Vixel Corporation

If you're still having trouble, please contact Vixel Technical Support in one of these ways:

Phone: (888) 881-6085 (Be sure to call from a phone next to where the problem is occurring.)

Fax: (425) 806-4502

Email: support@vixel.com

Corporate Address:
Vixel Corporation
11911 North Creek Parkway South
Bothell, WA 98011

Warranty

Effective for Products shipped after January 1, 2000

Warranty

Vixel warrants for a period of (i) 36 months after shipment that Vixel Series 1000, 2000, 7000, 8000 and Vixel manufactured transceiver hardware product(s) and embedded firmware and (ii) 12 months after shipment that Vixel software products will, in normal use, conform in all material respects to their applicable published specifications. Vixel warrants that the media upon which Vixel Software is loaded will, in normal use, be free of defects in materials and workmanship for a period of 6 months from the date of shipment.

Non Conforming Products

In the event a Vixel hardware product or software media fails to so conform during the warranty period, Vixel shall provide a replacement product in accordance with its then current Warranty Exchange Program. Vixel shall issue a correction quarterly for deviations of the software product from its specifications reported to Vixel or the Vixel authorized reseller during its warranty period.

Scope of Warranty and Exclusions

The foregoing warranties do not apply to any Vixel product that (a) has been altered, except by Vixel, (b) has been improperly handled, installed, operated or packaged, or (c) has been damaged by accident, misuse, negligence, or external factors such as failure or fluctuation of electrical power or air conditioning, fire, flood, or interconnection or combination with non-Vixel Products.

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Warranty Limitation

The warranties granted hereunder are given to and enforceable only by Buyer. Warranties are neither assignable nor transferable. **End Users should contact their OEM, Distributor, VIP, VAR, or SI for direct support of Vixel Warranty.**

Problem Isolation

Installation and operational problems in an Arbitrated Loop environment are typically caused by one of the following:

- faulty cabling or cable connector
- incorrect cable length
- faulty Gigabit Interface Converter (GBIC)
- invalid Fibre Channel signaling from the Host Bus Adapter (HBA) or disk array
- device driver / microcode conflicts between HBA's and other devices

The following guidelines will help to isolate and correct physical layer problems. For protocol-related problems (e.g. in-operability between devices), please refer to the appropriate vendor's diagnostic guides.

Port Status LEDs

The Vixel 1000 provides two status LEDs for each port to aid in quickly diagnosing and recovering from problems.

The upper, green LED is lit when an operational GBIC is installed. The lower, amber LED should only be lit when the port is in bypass mode. In bypass mode, the hub's port receiver is disabled, thus preventing erratic signals or data from corrupting loop activity. Bypass may be triggered by loss of valid signal or a GBIC fault.

The combination of green and amber LEDs indicate four states:

LED Appearance	Port State
 Green off, Amber off	No GBIC Installed (Port Bypassed)
 Green on, Amber off	GBIC Installed / GBIC Operational / Valid Fibre Channel Signal
 Green off, Amber on	GBIC Installed / GBIC Transmitter or Receiver Fault (Port Bypassed)
 Green on, Amber on	GBIC Installed / GBIC Operational / No Valid Fibre Channel Signal (Port Bypassed)

Table: Status LED States

Figure 4-1 below shows the rear of a Vixel 1000 with each port in one of the four states outlined above.

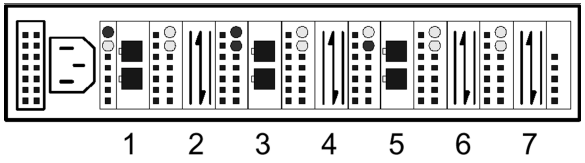

Figure 4-1. *LED Port Status*

Port 1 - GBIC Installed / GBIC Operational / Valid Fibre Channel Signal

Port 2 - No GBIC Installed (Port Bypassed)

Port 3 - GBIC Installed / GBIC Operational / No Valid Fibre Channel Signal (Port Bypassed)

Port 4 - No GBIC Installed (Port Bypassed)

Port 5 - GBIC Installed / GBIC Transmitter or Receiver Fault (Port Bypassed)

Port 6 - No GBIC Installed (Port Bypassed)

Port 7 - No GBIC Installed (Port Bypassed)

Verifying GBIC and Cable Signal Presence

In addition to port LED status, signal presence can be verified by holding a piece of white paper over the transmitter of the GBIC or fiber optic cable end and observing the red laser emission. Fiber optics for Arbitrated Loop are non-OFC, a low intensity laser that is normally safe for short exposures to the unprotected eye. However, a faulty GBIC may suffer internal shorts that boost the laser output to dangerous levels. **Hold a small piece of white paper over any laser-emitting source to verify output.**

WARNING: Optical GBICs emit invisible laser radiation. Do not stare into the transmitted beam.

To verify signal presence at the hub end of a link, insert a GBIC into the Vixel 1000 and, with a piece of white paper over the GBIC end, observe the bottom SC connector. A low intensity red light should be present at the GBIC transmitter as shown in Figure 4-2 (below).

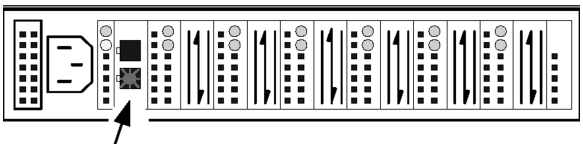

Figure 4-2. Low intensity red light (Non-OFC laser emission)

Node End - To verify the integrity of the fiber optic cable at the node end of a link, make sure that the cable is attached to a GBIC at the hub and that the hub is powered on. Dual SC fiber optic cable connectors are keyed and will only insert into a GBIC in one direction. At the node end of the link, a low intensity red light should be visible on the "A" SC lead as shown in Figure 4-3 (below). (Note: At least one active device must be present on the loop before light will be transmitted through the GBIC ports.)

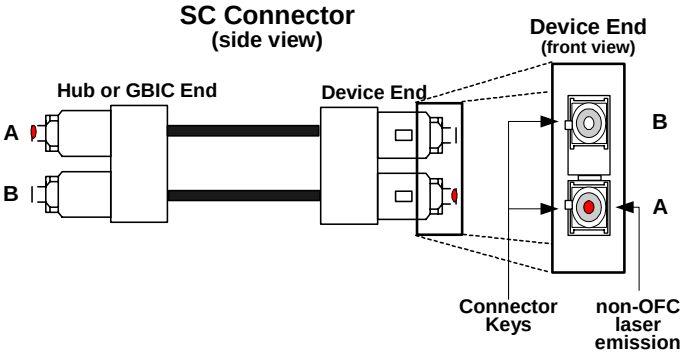

Figure 4-3. *Non-OFC laser emission at SC connector of a fiber optic cable*

Fiber optic cables manufactured by AMP are marked with an "A" for the receiver lead and "B" for the transmitter lead. An AMP multi-mode cable plugged into a GBIC, HBA or disk array controller will be key-oriented with the "B" lead inserted into the device's transmitter. At the opposite end of the cable, low intensity red light should be visible on the "A" receiver lead. **Hold a small piece of white paper over any laser-emitting source to verify output.**

WARNING: Optical GBICs emit invisible laser radiation. Do not stare into the transmitted beam.

If a fiber optic cable has good transmitter throughput but a broken or degraded receiver lead, the end node may sense a "loop down" state. Since the transmitter is good, the hub will respond to the end node's valid Fibre Channel signal and cut the

device into the loop. But since the end node is not receiving Fibre Channel signals, it will stream “loop down” sequences onto the loop. This will cause the loop to go down; re-initialization then occurs, stopping all communications between devices on the loop until the condition is corrected.

To verify the fiber optic cable at the hub end, reverse the procedure above. Make sure the fiber optic cable is plugged into the Host Bus Adapter (HBA) at the host or into a disk array controller and that the device is powered on. Examine the cable’s SC lead “A” to verify that a low intensity red light is visible on the receiver lead.

Course of Action for Problem Resolution

Problem	Recommended Action
GBIC installed in one or more ports but no LEDs lit	Verify power cord is firmly seated into hub and is connected to a properly earthed receptacle (outlet).
GBIC installed but only amber LED is lit	Reseat the GBIC. If the same condition occurs, the GBIC is faulty and should be replaced.
GBIC installed with both green and amber LEDs lit	The hub is not receiving a valid Fibre Channel signal from the end node (HBA or disk array). 1) Unplug the fiber cable from the node and verify that an optical signal is present on the cable receiver lead. If no red light is visible, the cable may be bad. Replace the cable. 2) Examine the SC connectors on the HBA or disk controller. If no red light is visible on the transmitter lead, the device may require rebooting, device drivers may need to be reinstalled, or the HBA or disk controller hardware may require servicing. 3) If light is present on both the cable lead and the end node, the HBA or disk controller may require service.
GBIC installed with only green LED lit, but devices are not communicating	The hub is receiving a valid Fibre Channel signal from the end device (HBA or disk), but no upper level protocols are active. 1) Verify that the proper HBA device drivers are loaded for the appropriate operating system and that the host has been configured to recognize attached disk devices. 2) Unplug the fiber cable from the end node and verify that an optical signal is present on the cable receiver lead. If no signal is present, the receiver lead of the cable may be bad and the device may be streaming ""loop down.""

Table: Problem Determination and Resolution

APPENDIX A

Regulatory and Safety Information

The regulatory and safety information in this appendix applies to the Vixel 1000 Fibre Channel Arbitrated Loop Hub. This information is presented in English and in other languages, as shown above.

Regulatory and Safety Information

Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous optical radiation exposure.

This unit emits visible laser radiation. Do not open the unit or alter it in any way.

Laser Compliance Statement

Some products are equipped with a Gigabit Interface Converter (GBIC). The GBIC is a Class 1 laser product and is certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products. Elsewhere, the GBIC is certified to conform to the requirements of the International Electrotechnical Commission (IEC) 825 and CENELEC EN 60 825 for Class 1 laser products.

CAUTION: Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous optical radiation exposure.

Removing the covers of the GBIC may result in exposure to hazardous laser radiation. There are no serviceable parts inside the GBIC. Do not remove the GBIC covers.

WARNING: Do not stare into the laser beam, do not view with optical instruments, and avoid direct exposure to the beam.

Regulatory Compliance

This product is designed for both domestic and international distribution and has been certified by one or more of the following regulatory bodies as identified on the nameplate:

- A Nationally Recognized Testing Laboratory (NRTL) to UL, CSA and CE standards
- Australian Communications Authority (C-Tick)
- Canadian Standards Association (CSA)
- DEMKO A/S (D)
- European Low Voltage and Electromagnetic Compatibility Directives (CE)
- FIMKO LTD. (F)
- NEMKO A/S (N)
- Official Mexican Norms (NOM)
- SEMKO A/B (S)
- TUV Product Service (TUV)
- Underwriter's Laboratories, Incorporated (UL)
- United States Center for Devices and Radiological Health (CDRH)
- United States Federal Communications Commission (FCC)

- Voluntary Control Council for Interference by Information Technology Equipment (VCCI)

Shock Hazard

WARNING: To avoid shock hazard, do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.

To avoid shock hazard:

The power cord must be connected to a properly wired and earthed receptacle.

Any equipment to which this product will be attached must be connected to properly wired receptacles.

When possible, use one hand to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

Electrical current from power, telephone, and communications cables is hazardous. To avoid shock hazard, follow the procedures below.

To Connect

1. Attach signal cables to receptacles.
2. Attach power cord to properly earthed receptacle.

To Disconnect

1. Remove power cord.
2. Remove signal cables from devices.

Federal Communications Commission (FCC) Statement

NOTE: This equipment has been tested and found to comply with the emission limits for a Class A or Class B digital device, as identified on the nameplate, pursuant to CFR47, Part 15 of the 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 communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors and FCC Class A or B certified GBICs must be used in order to meet the FCC emission limits specified in CFR47, Part 15. Vixel is not responsible for interference caused by using other than recommended cables, connectors, or GBICs or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications may void the user's authority to operate this equipment.

The user assumes all responsibilities for verifying that this equipment is in compliance with CFR47, Part 15 when other than the recommended cables, connectors or GBICs are used.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

European Community Directive Conformance Statement

This product has been tested and found to be in conformance with the protection requirements of EC Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

Attention: This is a Class A or B product as identified on the nameplate. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

违反此管制条例的控制、调整或操作过程会使人员受到危险的光学辐射。

此装置发射可见激光辐射。切勿打开该装置或对其作任何改动。

敫光规范化声明

有些产品配有千兆位界面转换器(GBIC)，千兆位界面转换器是甲类(Class 1)激光产品，该产品在美国通过鉴定，符合健康与人类服务部联邦管制条例(DHHS 21 CFR) (Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J)法规第 21 条 J 节对甲类激光产品的规定标准。此外，千兆位界面转换器还通过鉴定，符合国际电器委员会(IEC)第 825 条与 CENELEC EN 60 825 条例对甲类激光产品的规定标准。

注意：违反此管制条例之控制、调整或操作过程会使人员受到危险的光学辐射。

打开千兆位界面转换器的盖子会使人员受到危险的激光辐射。在千兆位界面转换器的内部没有任何需要维修的部件，**切勿打开千兆位界面转换器的盖子**。

警告：切勿直视激光束，切勿透过光学仪器观看激光束。并应避免直接暴露于激光束。

管制条例实施

本产品为国内与国际分销而设计，并通过下列一个或多个管制机构的鉴定，请见标签所示的管制机构名称：

- Nationally Recognized Testing Laboratory（联邦认可之测试实验所）(NRTL)，符合 UL（UL 测试与鉴定联合体）、CSA（加拿大标准协会）以及 CE（欧洲低电压与电磁兼容规程委员会）标准
- Australian Communications Authority（澳大利亚通讯管理局）(C-Tick)
- Canadian Standards Association（加拿大标准协会）(CSA)
- DEMKO A/S (D)
- European Low Voltage and Electromagnetic Compatibility Directives（欧洲低电压与电磁兼容规程委员会）(CE)
- FIMKO LTD.（FIMKO 有限公司）(F)
- NEMKO A/S (N)
- Official Mexican Norms（墨西哥官方规范委员会）(NOM)
- SEMKO A/B (S)
- TUV Product Service（TUV 产品服务组织）(TUV)
- Underwriter's Laboratories, Incorporated（UL 测试与鉴定联合体）(UL)
- United States Center for Devices and Radiological Health（美国装置与辐射健康中心）(CDRH)
- United States Federal Communications Commission（美国联邦通讯委员会）(FCC)
- Voluntary Control Council for Interference by Information Technology Equipment（信息技术设备自愿管制理事会）(VCCI)

警告：为避免电击危险，切勿在闪电雷击期间连接或断开任何电缆，也不要安装、维修或重新装配本产品。

为避免电击危险:

电源线必须连接到正确接线和妥善接地的电源插座上。

本产品将要连接的所有设备也必须连接到接线正确的插座上。

如果可能，应使用单手连接或断开连接信号电缆，以避免在接触两个具有不同电势的表面时遭到电击。

电源线、电话线以及通讯电缆中的电流非常危险，为免受电击，应按下列步骤连接或断开电缆。

连接

1. 将信号电缆连接到信号插座。
2. 将电源线连接到妥善接地的电源插座。

断开

1. 从电源插座拔掉电源线。
2. 从装置上拔下全部信号电缆。

联邦通讯委员会（FCC）声明

注释：本装置已通过测试，并且如标签所示，符合联邦通讯委员会规章第 15 节 CFR47 条例对甲类(Class 1)或乙类(Class 2)数字式装置的放射限制标准。制定这些限制是为了提供合理的防护，克服设备在商业环境中使用时所造成的有害干扰。本设备产生、使用并可发射无线电通讯信号。在居民区使用该设备可能会造成有害干扰；在这种情形下，使用者将需要自行消除干扰并担负全部费用。

为了符合联邦通讯委员会第 15 节 CFR47 条例中规定的放射限制标准，必须使用有适当屏蔽并妥善接地的电缆、连接器与联邦通讯委员会甲类或乙类鉴定（注：此处原文误为监定）合格的千兆位界面转换器。对于因使用其它非推荐的电缆、连接器或千兆位界面转换器，或者未经认可而擅自对本设备进行改动或改装所造成的干扰，Vixel 不承担任何责任。未经认可而擅自对本设备进行改动或改装将导致使用者丧失对本设备的操作权。

当使用其它非推荐的电缆、连接器或千兆位界面转换器时，使用者将承担全部责任，以确实保证本设备符合第 15 节 CFR47 条例中的规定。

本装置符合联邦通讯委员会规章第 15 节的规定。操作者必须符合下列两个条件:(1) 本装置将不会引起有害干扰。(2)本装置必须承受所收到的任何干扰，包括可能导致操作者异常的干扰。

欧洲共同体规程实施声明

本产品已通过测试，并符合欧洲共同体(EC)理事会规程 89/336/EEC 关于电磁兼容性的防护规定标准，该规程具有类似成员国法律之效力。

注意：如标签所示，本设备系甲类或乙类产品，在国内环境中使用时，此产品可能会产生无线电干扰；在这种情形下，可能会要求使用者采取某些适当的措施。

Chinese, Traditional *Regulatory and Safety Information*

管制與安全資訊

違反此管制條例之控制、調整或操作過程會使人員受到危險的光學輻射。

此裝置發射可見雷射輻射。切勿打開該裝置或對其作任何改動。

雷射規範化聲明

有些產品配有千兆位介面轉換器 (GBIC)。千兆位介面轉換器屬甲類（Class 1）雷射產品，該產品在美國通過鑑定，符合健康與人類服務部聯邦管制條例（DHHS 21 CFR）(Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J) 法規第 21 條 J 節對甲類雷射產品之規定標準。此外，千兆位介面轉換器還通過鑑定，符合國際電氣委員會 (IEC) 第 825 條與 CENELEC EN 60 825 條例對甲類雷射產品之規定標準。

注意：違反此管制條例之控制、調整或操作過程會使人員受到危險的光學輻射。

打開千兆位介面轉換器的蓋子會使人員受到危險的雷射輻射。在千兆位介面轉換器的內部無任何需要維修的部件。**切勿打開千兆位介面轉換器的蓋子。**

警告：切勿直視雷射束，切勿透過光學儀器觀看雷射束，並應避免直接暴露於雷射束。

管制條例實施

本產品為國內與國際分銷而設計，並通過下列一個或多個管制機構之鑑定，請見標籤所示管制機構名稱：

- 經國家認可之測試實驗所 (NRTL)，達到 UL（美國保險商試驗所）、CSA（加拿大標準協會）以及 CE（歐共體）標準
- Australian Communications Authority（澳洲通信管理局）(C-Tick)
- Canadian Standards Association（加拿大標準協會）(CSA)
- DEMKO A/S (D)
- European Low Voltage and Electromagnetic Compatibility Directives（歐洲低電壓與電磁兼容規程委員會）(CE)
- FIMKO LTD.（FIMKO 有限公司）(F)
- NEMKO A/S (N)
- Official Mexican Norms（墨西哥官方規範委員會）(NOM)
- SEMKO A/B (S)
- TÜV Product Service（TÜV 產品服務組織）(TÜV)
- Underwriter's Laboratories, Incorporated（UL 測試與鑑定聯合體）(UL)

- United States Center for Devices and Radiological Health（美國裝置與輻射健康中心）(CDRH)
- United States Federal Communications Commission（美國聯邦通信委員會）(FCC)
- Voluntary Control Council for Interference by Information Technology Equipment（資訊技術設備自願管制理事會）(VCCI)

電擊危險

警告：爲避免電擊危險，切勿在閃電雷擊期間連接或斷開任何電纜，也不要安裝、維修或重新裝配本產品。

為避免電擊危險：

電源線必須連接到接線正確與妥善接地的電源插座上。

本產品將要連接的所有設備也必須連接到接線正確的插座上。

儘可能用單手連接或斷開連接信號電纜，以避免因接觸兩個電位不同的表面而遭到電擊。

電源線、電話線以及通信電纜中的電流非常危險。為避免遭受電擊，應依照下列步驟連接或斷開電纜。

連接

1. 將信號電纜連接到信號插座。
2. 將電源線連接到妥善接地的電源插座。

斷開

1. 從電源插座上拔掉電源線。
2. 從裝置上拔下全部信號電纜。

聯邦通信委員會 (FCC) 聲明

註釋：本裝置已通過測試，並且如標籤所示，符合聯邦通信委員會規章第15節 CFR47 條例對甲類（Class 1）或乙類（Class 2）數字式裝置的放射限制標準。制定這些限制是為了提供合理的防護，克服設備在商業環境中使用時所造成的有害干擾。本設備產生、使用並可發射無線電通信信號。在居民區使用該設備可能會造成有害干擾；在這種情形下，使用者將需要自行消除干擾並擔負全部費用。

為了符合聯邦通信委員會第 15 節 CFR47 條例中規定的放射限制標準，必須使用有適當屏蔽並妥善接地的電纜、連接器與經聯邦通信委員會甲類或乙類鑑定合格的千兆位介面轉換器。對於因使用其他非推荐的電纜、連接器或千兆位介面轉換器，或

者未經認可而擅自對本設備進行改動或改裝所造成的干擾，Vixel 不承擔任何責任。未經認可而擅自對本設備進行改動或改裝將導致使用者喪失對本設備的操作權。

當使用其他非推荐的電纜、轉接器或千兆位介面轉換器時，使用者將承擔全部責任，以確實保證本設備符合第 15 節 CFR47 條例中的規定。

本裝置符合聯邦通信委員會規章第 15 節之規定。操作必須符合下列兩個條件：（1）本裝置將不會引起有害干擾。（2）本裝置必須承受所收到的任何干擾，包括可能導致操作異常的干擾。

歐洲共同體規程實施聲明

本產品已通過測試，並符合歐洲共同體（EC）理事會規程 89/336/EEC 關於電磁兼容性之防護規定標準，該規程具有類似成員國法律之效力。

注意：如標籤所示，本設備係甲類或乙類產品，在國內環境中使用時，此產品可能會產生無線電干擾；在這種情形下，可能會要求使用者采取某些適當的措施。

Dutch *Regulatory and Safety Information*

Voorschriften en veiligheidsinformatie

Bediening, aanpassingen of procedures die niet in deze handleiding zijn opgegeven, kunnen blootstelling aan gevaarlijke optische straling veroorzaken.

Deze eenheid brengt zichtbare laserstraling voort. Probeer nooit de eenheid te openen of te wijzigen.

Laserverklaring

Sommige producten zijn uitgerust met een Gigabit Interface Converter (GBIC). De GBIC is in de Verenigde Staten erkend als een Klasse 1 laserproduct onder de 21 Code of Federal Regulations van het Amerikaanse ministerie van gezondheid (DHHS 21 CFR) (Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J), onderdeel J voor Klasse 1 laserproducten. Elders is de GBIC erkend als een apparaat dat voldoet aan de vereisten van IEC-825 en CENELEC EN 60 825 voor Klasse 1 laserproducten.

LET OP: Bediening, aanpassingen of procedures die niet in deze handleiding zijn opgegeven, kunnen blootstelling aan gevaarlijke optische straling veroorzaken.

Verwijdering van de deksels van de GBIC kan blootstelling aan gevaarlijke laserstraling veroorzaken. In de GBIC bevinden zich geen onderdelen die onderhoud behoeven. **Probeer niet de deksels van de GBIC te verwijderen.**

WAARSCHUWING: Kijk niet rechtstreeks of met een optisch instrument in de laserstraal en vermijd rechtstreekse blootstelling aan de laserstraal.

Conformiteit

Dit product is ontworpen voor distributie in binnen- en buitenland en is erkend door één of meer van de onderstaande regelgevende instanties, zoals aangegeven op de kenplaat.

- Een nationaal erkend testlaboratorium volgens de standaards UL, CSA en CE.
- Australian Communications Authority (C-Tick)
- Canadian Standards Association (CSA)
- DEMKO A/S (D)
- Europese richtlijnen voor laagspanning en elektromagnetische compatibiliteit (CE)
- FIMKO LTD. (F)
- NEMKO A/S (N)
- Official Mexican Norms (NOM)
- SEMKO A/B (S)
- TÜV Product Service (TÜV)
- Underwriter's Laboratories, Incorporated (UL)
- United States Center for Devices and Radiological Health (CDRH)
- United States Federal Communications Commission (FCC)
- Voluntary Control Council for Interference by Information Technology Equipment

Schokgevaar

WAARSCHUWING: Om schokgevaar te voorkomen dient u bij onweer geen kabels aan te sluiten of los te koppelen. Verricht onder dergelijke omstandigheden geen installatie-, onderhouds- of reconfiguratiewerkzaamheden.

Respecteer de volgende punten om schokgevaar te voorkomen:

Het netsnoer moet worden aangesloten op een juist bedraad en geaard stopcontact.

Alle apparatuur waarmee dit product wordt verbonden, moet zijn aangesloten op een juist bedraad stopcontact.

Probeer zo mogelijk signaalkabels altijd met één hand aan te sluiten of te verwijderen en zodoende schokgevaar te voorkomen dat wordt veroorzaakt door het aanraken van twee oppervlakken met een verschillend elektrisch potentieel.

Elektrische stroom afkomstig van netsnoeren, telefoondraden en communicatiekabels is gevaarlijk. Volg de onderstaande procedures om schokgevaar te voorkomen.

Tijdens het aansluiten

1. Sluit de signaalkabels op de betreffende connectors aan.
2. Sluit het netsnoer op een juist geaard stopcontact aan.

Tijdens het loskoppelen

1. Verwijder het netsnoer.
2. Koppel de signaalkabels van de apparaten los.

FCC-voorschriften

OPMERKING: Dit apparaat is getest en voldoet zoals aangegeven op de kenplaat aan de emissie-limieten voor een digitaal apparaat, Klasse A of B, in overeenstemming met CFR47, Deel 15, van de FCC-regels. Deze limieten zijn bedoeld om redelijke bescherming tegen schadelijke radiostoringen te geven bij installatie in een bedrijf. Dit apparaat genereert en gebruikt radiofrequentie-energie en kan deze ook afgeven. Het gebruik van dit apparaat in een woonomgeving kan schadelijke storingen veroorzaken. De gebruiker is in dat geval verplicht de storingen op eigen kosten te verhelpen.

Het gebruik van juist afgeschermde en geaarde kabels en connectors en van door de FCC als Klasse A of B erkende GBIC's is verplicht om te voldoen aan de emissie-limieten van de FCC vermeld in Deel 15 van CFR47. Vixel is niet verantwoordelijk voor storingen voortvloeiend uit het gebruik van andere dan de aanbevolen kabels, connectors of GBIC's of veroorzaakt door niet goedgekeurde wijzigingen of aanpassingen aan het apparaat. Niet goedgekeurde wijzigingen of aanpassingen kunnen de bevoegdheid van de gebruiker om dit apparaat te bedienen tenietdoen.

De gebruiker dient zelf te controleren of dit apparaat voldoet aan Deel 15 van CFR47 wanneer andere dan de aanbevolen kabels, connectors of GBIC's worden gebruikt.

Dit apparaat voldoet aan Deel 15 van de FCC-regels. Het gebruik ervan is onderhevig aan de volgende voorwaarden: (1) dit apparaat mag geen schadelijke storingen veroorzaken en (2) dit apparaat dient alle ontvangen storingen te accepteren, zelfs indien deze onjuist functioneren veroorzaken.

Conformiteitsverklaring Europese richtlijn

Dit apparaat is getest en voldoet aan de vereisten van de richtlijn 89/336/EEG van de Europese Raad aangaande de uniformisering van de wetgeving in de lidstaten met betrekking tot elektromagnetische compatibiliteit.

Let op: Dit is een Klasse A of B product, zoals aangegeven op de kenplaat. Bij installatie in een woning kan dit product radiostoringen veroorzaken. De gebruiker is in dat geval verplicht de gewenste maatregelen te treffen.

Réglementations et consignes de sécurité

L'utilisation de commandes, de réglages ou de procédures autres que celles spécifiées dans ce document peut entraîner une exposition dangereuse aux rayons lumineux.

Cette unité émet des rayons laser visibles. N'ouvrez pas l'unité et ne la modifiez en aucune façon.

Conformité laser

Certains produits sont équipés d'une interface GBIC. L'interface GBIC est un produit laser de classe 1 conforme aux réglementations du ministère de la santé américain (Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J). L'interface GBIC est conforme aux réglementations de la Commission Électrotechnique Internationale (CEI) 825 et CENELEC EN 60 825 pour les produits laser de classe 1.

ATTENTION : l'utilisation de commandes, de réglages ou de procédures autres que celles spécifiées dans ce document peut entraîner une exposition dangereuse aux rayons lumineux.

Le retrait des capots de l'interface GBIC peut entraîner une exposition dangereuse aux rayons laser. L'interface GBIC ne contient aucune pièce réparable par l'utilisateur. **Ne retirez pas les capots de l'interface GBIC.**

AVERTISSEMENT : ne regardez jamais directement le rayon laser, ne l'observez pas à l'aide d'instruments optiques et évitez toute exposition directe au rayon.

Déclaration de conformité

Ce produit a été conçu afin d'être distribué aux États-Unis et dans d'autres pays, et, comme l'indique sa plaque d'identification, il a reçu l'agrément des organismes suivants :

- Un laboratoire d'essai de renommée nationale(NRTL), conforme aux normes UL, CSA et CE
- Australian Communications Authority (C-Tick)
- Association Canadienne de Normalisation (CSA)
- DEMKO A/S (D)
- Directives européennes sur la basse tension et la compatibilité électromagnétique (CE)
- FIMKO LTD. (F)
- NEMKO A/S (N)
- Official Mexican Norms (NOM)
- SEMKO A/B (S)
- TÜV Product Service (TÜV)
- Underwriter's Laboratories, Incorporated (UL)
- United States Center for Devices and Radiological Health (CDRH)

- United States Federal Communications Commission (FCC)
- Voluntary Control Council for Interference by Information Technology Equipment (VCCI)

Risque d'électrocution

AVERTISSEMENT : afin d'éviter les risques d'électrocution, ne branchez ni ne débranchez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit pendant un orage.

Pour éviter les risques d'électrocution :

Le cordon d'alimentation doit être branché sur une prise avec mise à la terre.

Les équipements auxquels ce produit est relié doivent être branchés sur une prise avec mise à la terre.

Lorsque cela est possible, branchez ou débranchez les câbles de signal d'une seule main afin d'éviter que le contact avec deux surfaces dont les potentiels électriques sont différents n'entraîne des risques d'électrocution.

Le courant électrique des câbles d'alimentation, de téléphone et de télécommunications est dangereux. Pour éviter les risques d'électrocution, suivez les procédures indiquées ci-dessous.

Pour brancher

1. Branchez les câbles de signal dans les réceptacles.
2. Branchez le cordon d'alimentation sur une prise avec mise à la terre.

Pour débrancher

1. Débranchez le cordon d'alimentation.
2. Débranchez les câbles de signal des appareils.

Déclaration de conformité FCC

REMARQUE : comme le stipule sa plaque d'identification, cet équipement a été testé et reconnu conforme aux limites d'émission pour un appareil numérique de classe A ou de classe B de la réglementation FCC CFR47, Part 15. Ces limites ont été conçues afin de protéger l'équipement contre les interférences, lors de son utilisation dans un environnement commercial. Cet équipement produit, utilise et peut émettre des signaux radio. Son utilisation dans une zone résidentielle peut produire des interférences auxquelles l'utilisateur devra remédier à ses propres frais.

Des câbles et des connecteurs blindés et mis à la terre, et des interfaces GBIC pour classe A ou B, doivent être utilisés conformément à la réglementation FCC CFR47, Part 15. Vixel n'est pas responsable des interférences causées par l'utilisation de câbles, de connecteurs ou d'interfaces GBIC autres que ceux recommandés, ni des modifications non autorisées apportées à cet équipement. De telles modifications peuvent entraîner l'annulation du droit d'utilisation de l'équipement.

L'utilisateur doit vérifier la conformité de cet équipement à la réglementation FCC CFR47, Part 15, lors de l'utilisation de câbles, de connecteurs ou d'interfaces GBIC autres que ceux recommandés.

Cet appareil est conforme à la section 15 de la réglementation FCC. Son utilisation est soumise aux deux conditions suivantes : (1) cet équipement ne doit pas entraîner d'interférences et (2) cet équipement ne doit pas être affecté par les interférences reçues, y compris celles qui peuvent entraîner un fonctionnement indésirable.

Déclaration de conformité CE

Cet appareil a été testé et reconnu conforme aux directives CE 89/336/EEC portant sur la compatibilité électromagnétique.

Attention : comme l'indique sa plaque d'identification, cet appareil est un produit de classe A ou B. Son utilisation dans un environnement domestique peut entraîner des interférences radio. Le cas échéant, l'utilisateur devra prendre les mesures correctives nécessaires.

German *Regulatory and Safety Information*

Vorschriften und Sicherheitsbestimmungen

Das Benutzen der Bedienelemente, das Vornehmen von Einstellungen und das Ausführen von Betriebsvorgängen hat gemäß der Anleitung zu erfolgen; andernfalls kann eine gefährliche optische Strahlung freigesetzt werden.

Dieses Gerät gibt sichtbare Laserstrahlung ab. Es darf nicht geöffnet oder in irgendeiner Weise verändert werden.

Einhaltung der Vorschriften für Laser

Einige Produkte sind mit einem Gigabit Interface Converter (GBIC) ausgerüstet. Der GBIC ist ein Laserprodukt der Klasse 1 und ist in den USA gemäß den Bestimmungen des "Department of Health and Human Services 21 Code of Federal Regulations" (DHHS 21 CFR = staatliches Amt für den Gesundheitsschutz der USA), Teil J, für Laserprodukte der Klasse 1 zertifiziert. In anderen Ländern ist der GBIC gemäss den Bestimmungen der "International Electrotechnical Commission" (IEC) 825 und CENELEC EN 60 825 für Laserprodukte der Klasse 1 zertifiziert.

ACHTUNG: Das Benutzen der Bedienelemente, das Vornehmen von Einstellungen und das Ausführen von Betriebsvorgängen hat gemäß der Anleitung zu erfolgen; andernfalls kann eine gefährliche optische Strahlung freigesetzt werden.

Durch Öffnen des Gehäuses des GBIC kann eine gefährliche Laserstrahlung freigesetzt werden. Innerhalb des GBIC befinden sich keine Teile, die vom Benutzer gewartet oder repariert werden können. **Das GBIC-Gehäuse darf nicht entfernt werden.**

WARNUNG: Blicken Sie nicht in den Laserstrahl, auch nicht mit optischen Instrumenten, und setzen Sie sich nicht direkt dem Strahl aus.

Einhaltung der örtlichen Bestimmungen

Dieses Produkt wurde für den Vertrieb in den USA und anderen Ländern entwickelt und wurde von einer oder mehreren der folgenden Behörden, wie auf dem Leistungsschild angegeben, zertifiziert:

- Ein staatlich anerkanntes Prüflabor für die Prüfung auf Einhaltung der UL-, CSA- und CE-Normen.
- Australian Communications Authority (C-Tick)
- Canadian Standards Association (CSA)
- DEMKO A/S (D)
- Europäische Vorschriften für Niederspannungsgeräte und Elektromagnetische Verträglichkeit (CE)
- FIMKO LTD. (F)
- NEMKO A/S (N)
- Amtliche Vorschriften Mexikos (NOM)
- SEMKO A/B (S)

- TÜV Product Service (Technischer Überwachungsverein)
- Underwriter's Laboratories, Incorporated (UL)
- United States Center for Devices and Radiological Health (CDRH)
- United States Federal Communications Commission (FCC)
- Voluntary Control Council for Interference by Information Technology Equipment (VCCI)

Gefahr elektrischen Schlags

WARNUNG: Um die Gefahr eines elektrischen Schlags zu vermeiden, sind während eines Gewitters das Anschließen oder Trennen von Kabeln, jegliche Installations- und Wartungsarbeiten sowie die Neukonfiguration des Geräts zu unterlassen.

Zur Vermeidung der Gefahr eines elektrischen Schlags ist folgendes zu beachten:

Das Netzkabel ist an eine ordnungsgemäß verdrahtete und geerdete Steckdose anzuschließen.

Jedes Gerät, das mit diesem Produkt verbunden wird, darf nur an eine ordnungsgemäß verdrahtete Steckdose angeschlossen werden.

Benutzen Sie beim Anschließen oder Abziehen der Signalkabel nach Möglichkeit nur eine Hand, um eventuelle elektrische Schläge, die durch das Berühren zweier Oberflächen mit unterschiedlichen elektrischen Potentialen entstehen könnten, auszuschließen.

Elektrische Ströme vom Netz, von Telefon und von Kommunikationskabeln können gefährlich sein. Um die Gefahr eines elektrischen Schlags auszuschließen, ist nach folgenden Verfahren vorzugehen.

Herstellen der Kabelverbindungen

1. Schließen Sie die Signalkabel an die entsprechenden Buchsen an.
2. Schließen Sie das Netzkabel an eine ordnungsgemäß geerdete Steckdose an.

Trennen der Kabelverbindungen

1. Ziehen Sie das Netzkabel aus der Steckdose.
2. Ziehen Sie die Signalkabel von den Geräten ab.

FCC-Erklärung (Federal Communications Commission)

HINWEIS: Dieses Gerät wurde auf die Einhaltung der Störstrahlungsgrenzwerte für digitale Geräte der Klasse A bzw. B (wie auf dem Leistungsschild angegeben) gemäß CFR47, Teil 15 der FCC-Vorschriften geprüft. Diese Grenzwerte sind für den üblichen Schutz gegen Störstrahlungen beim Betrieb des Geräts in einer kommerziellen Umgebung ausgelegt. Dieses Gerät erzeugt und benutzt Hochfrequenzenergie und kann diese abstrahlen. Beim Betrieb des Geräts im Wohnbereich ist das Auftreten solcher Störungen wahrscheinlich; in diesem Fall hat der Benutzer für deren Beseitigung selbst Sorge zu tragen.

Um die Grenzwerte für Störstrahlungen gemäß FCC CFR47, Teil 15 einzuhalten, sind ordnungsgemäß abgeschirmte und geerdete Kabel und Verbinder sowie gemäß FCC Klasse A oder B zertifizierte GBICs zu verwenden. Für Störungen, die durch den Einsatz anderer als der empfohlenen Kabel, Verbinder oder GBICs oder durch nicht genehmigte Veränderungen oder Modifikationen des Geräts verursacht werden, übernimmt Vixel keine Verantwortung. Nicht genehmigte Veränderungen oder Modifikationen können die Befugnis des Benutzers zum Betreiben dieses Geräts unwirksam machen.

Der Benutzer übernimmt die volle Verantwortung für die Einhaltung der FCC-Vorschrift CFR47, Teil 15, wenn andere als die empfohlenen Kabel, Verbinder oder GBICs verwendet werden.

Dieses Gerät entspricht Teil 15 der FCC-Vorschriften. Für das Betreiben des Geräts bestehen die folgenden zwei Bedingungen: (1) Dieses Gerät darf keine Störstrahlungen abgeben und (2) es muss jeglichen empfangenen Störstrahlungen standhalten, einschließlich solchen, die den normalen Betrieb beeinträchtigen können.

Vorschriften der Europäischen Gemeinschaft

Dieses Produkt wurde auf die Einhaltung der Schutzbestimmungen der EU-Direktive 89/336/EEC hinsichtlich der in den Mitgliedsstaaten geltenden Vorschriften zur elektromagnetischen Verträglichkeit überprüft.

Achtung: Dies ist ein Produkt der Klasse A oder B (wie auf dem Leistungsschild angegeben): Beim Betrieb im Wohnbereich kann dieses Gerät Störungen der Funkkommunikation verursachen; in diesem Fall hat der Benutzer möglicherweise geeignete Maßnahmen zu deren Beseitigung zu treffen.

Informazioni sulle normative e sulla sicurezza

L'uso di metodi di controllo o di regolazione o l'esecuzione di procedure non specificate in questo documento possono causare pericolo di esposizione ottica alle radiazioni.

Questa unità emette radiazioni laser visibili. Non aprire l'unità e non alterarla in alcun modo.

Dichiarazione di conformità alle normative laser

Alcuni prodotti sono muniti di un Convertitore di interfaccia Gigabit (Gigabit Interface Converter, GBIC). GBIC è un prodotto laser di Classe 1 ed è conforme ai requisiti previsti dal Codice 21 delle Norme Aggiunte J del Ministero della Sanità e della Previdenza Sociale degli Stati Uniti (DHHS 21 CFR) (Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J), inerenti ai prodotti laser di Classe 1. Altrove, il convertitore GBIC risulta conforme ai requisiti previsti dalla International Electrotechnical Commission (IEC) 825 e CENELEC EN 60 825 per i prodotti laser di Classe 1.

ATTENZIONE: L'uso di metodi di controllo o di regolazione o l'esecuzione di procedure non specificate in questo documento possono causare pericolo di esposizione ottica alle radiazioni.

La rimozione dei rivestimenti del GBIC può provocare l'esposizione a pericolose radiazioni laser. Nessuna delle parti interne del GBIC può essere riparata.
Non rimuovere i rivestimenti del GBIC.

AVVERTENZA: Non fissare il raggio laser, non esaminare mediante strumenti ottici ed evitare la diretta esposizione al raggio.

Conformità ai regolamenti

Questo prodotto può essere distribuito sia sul territorio nazionale degli Stati Uniti che all'estero ed è stato certificato da uno o più dei seguenti enti regolatori, identificati sulla targa del prodotto:

- Un laboratorio di test riconosciuto a livello nazionale (Nationally Recognized Testing Laboratory, NRTL) secondo gli standard UL, CSA e CE."
- Australian Communications Authority (C-Tick)
- Canadian Standards Association (CSA)
- DEMKO A/S (D)
- Direttive Europee sulle Compatibilità Elettromagnetica e a bassa tensione (CE)
- FIMKO LTD. (F)
- NEMKO A/S (N)
- Norme ufficiali messicane (NOM)
- SEMKO A/B (S)
- TÜV Product Service (TÜV)
- Underwriter's Laboratories, Incorporated (UL)

- United States Center for Devices and Radiological Health (CDRH)
- United States Federal Communications Commission (FCC)
- Voluntary Control Council for Interference by Information Technology Equipment (VCCI)

Rischio di shock elettrico

AVVERTENZA: Per evitare il rischio di shock elettrico, non connettere né disconnettere i cavi e non eseguire l'installazione, la manutenzione o la riconfigurazione di questo prodotto durante una perturbazione elettrica.

Per evitare il rischio di shock:

Collegare il cavo di alimentazione ad una presa di corrente messa a terra e ben cablata.

Assicurarsi che le apparecchiature collegate a questo prodotto siano a loro volta collegate a prese di corrente ben cablate.

Se possibile, usare una sola mano per collegare o scollegare i cavi dei segnali, evitando così il pericolo di shock dovuto al contatto con due superfici a potenziali elettrici diversi.

La corrente elettrica presente nei cavi d'alimentazione, telefonici e di comunicazione è pericolosa. Per evitare il rischio di shock, eseguire la seguente procedura.

Per collegare

1. Collegare i cavi dei segnali alle prese.
2. Collegare il cavo di alimentazione alla presa correttamente messa a terra.

Per scollegare

1. Rimuovere il cavo di alimentazione.
2. Rimuovere i cavi dei segnali dai dispositivi.

Dichiarazione della Federal Communications Commission (FCC)

NOTA: Questa apparecchiatura è stata collaudata ed è risultata conforme ai limiti di emissione per i dispositivi digitali appartenenti alla Classe A o alla Classe B, come identificato sulla targa del prodotto, in base all'Articolo 15 del codice CFR47 FCC. Questi limiti sono stati messi a punto per fornire una protezione ragionevole contro interferenza dannosa causata dall'apparecchiatura in funzione in ambienti commerciali. L'apparecchiatura genera, utilizza e può irradiare segnali radio. Il funzionamento di questa apparecchiatura in un'area residenziale può causare interferenza dannosa, nel qual caso l'utente sarà tenuto a correggere l'interferenza a proprie spese.

Devono essere utilizzati cavi e connettori messi a terra e schermati correttamente, nonché GBIC dotati di certificazione FCC per la Classe A o B, al fine di garantire la conformità ai limiti di emissione FCC specificati nell'Articolo 15 del codice CFR47. Vixel non è responsabile dell'interferenza causata dall'uso di cavi, connettori o GBIC non consigliati o a seguito di modifiche o cambiamenti non autorizzati apportati all'apparecchiatura. L'apporto di cambiamenti o di modifiche non autorizzati può annullare l'autorizzazione all'uso dell'apparecchiatura.

Nel caso in cui non siano utilizzati i cavi, i connettori o i convertitori GBIC consigliati, l'utente si assume ogni responsabilità per assicurare che l'apparecchiatura sia conforme all'Articolo 15 del codice CFR47.

Questo dispositivo è conforme all'Articolo 15 delle norme FCC. Il funzionamento è soggetto alle due condizioni seguenti: (1) questo dispositivo non può causare interferenza dannosa e (2) questo dispositivo deve accettare qualsiasi interferenza ricevuta, comprese le interferenze che potrebbero causarne il funzionamento indesiderato.

Dichiarazione di conformità alle direttive dell'Unione Europea

Questo prodotto è stato collaudato ed è risultato conforme ai requisiti di sicurezza contenuti nelle Direttive del Consiglio CE 89/336/EEC sull'approssimazione delle leggi degli Stati membri, in materia di compatibilità elettromagnetica.

Attenzione: Questo prodotto appartiene alla Classe A o B, come specificato sulla targa di identificazione. In un ambiente domestico può causare interferenze radio, nel qual caso l'utente sarà tenuto a prendere le misure adeguate.

Japanese *Regulatory and Safety Information*

規制と安全に関する情報

この文書で指定された以外のコントロール、調整、手順を行うと、目を危険な放射能にさらす可能性があります。

この装置は可視的なレーザー放射能を放射します。装置を開けたり、改造したりしないでください。

レーザー規制準拠声明

製品の中には、ギガビット・インターフェース・コンバータ（GBIC）を搭載しているものもあります。GBICはクラス1レーザー製品であり、米国保健福祉省の連邦規制条令21(DHHS 21 CFR)(Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J) のサブチャプターJ、クラス1レーザー製品に関する必要条件に準拠していることが認定されています。また、GBICは、国際電気標準会議(IEC) 825およびCENELEC EN 60 825のクラス1レーザー製品に関する、必要条件に準拠することが認定されています。

注意：この文書で指定された以外のコントロール、調整、手順を行うと、目を危険な放射能にさらす可能性があります。

GBICのカバーを外すと、危険なレーザーの放射能にさらされることがあります。GBICには、サービス可能なパーツは何もありません。**GBICのカバーを外さないでください。**

警告：レーザー光線を見つめないでください。光学機械を用いてレーザー光線を見ないでください。光線に直接当たらないようにしてください。

規制の準拠

この製品は、国内および国外での販売用に設計されています。下記の規制機関のひとつまたは複数により認定されており、銘板に表示してあります。

- UL、CSA、CE規準検査実施資格保有のNRTL（Nationally Recognized Testing Laboratory = 国の定める試験機関）
- Australian Communications Authority（C-Tick）
- Canadian Standards Association（CSA）
- DEMKO A/S （D）
- European Low Voltage and Electromagnetic Compatibility Directives（CE）
- FIMKO LTD. (F)
- NEMKO A/S （N）
- Official Mexican Norms（NOM）
- SEMKO A/B （S）
- TÜV Product Service（TÜV）
- Underwriter's Laboratories, Incorporated (UL)
- United States Center for Devices and Radiological Health（CDRH）

- United States Federal Communications Commission (FCC)
- Voluntary Control Council for Interference by Information Technology Equipment (VCCI)

感電の危険

警告：感電の危険を避けるために、雷雨の最中には、本製品のケーブルの接続や切断、または、設置、整備、再構成をしないでください。

感電の危険を避けるには：

電源コードは、適切に配線され、アースを取ったコンセントに接続しなければなりません。

本製品に接続するすべての機器は、適切に配線されたコンセントに接続しなければなりません。

電位差のある２つの異なる表面に接触することで起きる感電を防ぐために、なるべく片手だけを使用して、信号ケーブルの接続または切断を行ってください。

電源、電話、通信ケーブルからの電流は危険です。感電の危険を避けるには、次の手順に従ってください。

接続するには：

１．信号ケーブルをコンセントに接続する。
２．電源コードを、適切にアースをとったコンセントに接続する。

切断するには：

１．電源コードを外す。
２．信号ケーブルを装置から外す。

連邦通信委員会 (FCC) 声明

注記：この機器は試験済みであり、クラス A またはクラス B のデジタル装置の放射制限に準拠しており、FCC 規則第 15 部 CFR47 に準拠し、銘板に表示しています。放射制限は、機器を商業的な環境で操作する場合の有害な妨害に対して、適切な保護をするものです。この機器は、電磁気エネルギーを生成、使用、放射します。本機器を住居地域で操作すると、有害な妨害を引き起こす可能性があり、妨害の補正費用はユーザーの負担になります。

FCC 規則第 15 部 CFR47 で指定された FCC 放射制限に準拠するためには、適切にシールドされアースのとれたケーブルとコネクタ、および FCC クラス A または B 認定の GBIC が使用されなければなりません。Vixel 社は、推奨以外のケーブル、コネクタ、または GBIC の使用により引き起こされた妨害、またこの機器を無許可で変更や改造したために起こった妨害に対して、責任を負いません。無許可で変更や改造を行うと、この機器を操作するユーザーの権限が無効になることがあります。

推奨以外のケーブル、コネクタ、またはGBIC を使用する場合、ユーザーは、この機器が FCC 規則第 15 部 CFR47 に準拠することを確実にする責任をすべて負います。

本装置は、FCC 規則第 15 部に準拠します。操作は次の 2 点を条件とします。(1) 本装置は、有害な妨害を引き起こしてはなりません。(2) 本装置は、望ましくない操作を引き起こす原因となる妨害を含めて、受信したすべての妨害を受容しなければなりません。

欧州共同体指令準拠声明

本製品は試験済みであり、加盟国の法律と近似する、欧州共同体会議指令 89/336/EEC の電磁気の互換性に関連する保護必要条件に準拠しています。

注意：本製品はクラス A または B の製品で、銘板に表示してあります。住宅地域環境では、本製品は、電磁気エネルギー妨害を引き起こす場合があり、その場合は、ユーザーは適切な対策を講じる必要があります。

Información reglamentaria y de seguridad

El uso de controles, ajustes o realización de procedimientos distintos a los que se especifican en este documento, puede causar una peligrosa exposición óptica a la radiación.

Esta unidad emite radiación láser visible. No abra la unidad ni la modifique de ninguna manera.

Declaración de conformidad con requerimientos para productos láser

Algunos productos están equipados con un Convertidor de Interfaz de Gigabits (GBIC, siglas en inglés). El GBIC es un producto láser de la Clase 1 y su conformidad está certificada en los EE.UU. para con los requisitos del Código 21 de las Normas Federales del Departamento de Servicios Sanitarios y Humanos (DHHS CFR 21) (Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J) Subcapítulo J para los productos láser de la Clase 1. En los demás países, la conformidad del GBIC está certificada para con los requisitos de la Comisión Electrotécnica Internacional (IEC) 825 y CENELEC EN 60 825 para productos láser de la Clase 1.

PRECAUCIÓN: El uso de controles, ajustes o realización de procedimientos distintos a los que se especifican en este documento, puede causar una peligrosa exposición óptica a la radiación.

El quitar las cubiertas del GBIC puede producir una exposición a la radiación peligrosa de láser. Dentro del GBIC no hay piezas a las que se pueda dar servicio. **No quitar las cubiertas del GBIC.**

ADVERTENCIA: No mirar fijamente hacia el rayo láser, no mirarlo con instrumentos ópticos y evitar la exposición directa al rayo.

Conformidad reglamentaria

Este producto se ha diseñado para la distribución nacional e internacional y ha sido certificado por una o más de las siguientes entidades reglamentarias como se identifica en la placa de identificación:

- Un Laboratorio de Pruebas Reconocido Nacionalmente (NRTL) de estandares UL, CSA, y CE.
- Australian Communications Authority (C-Tick)
- Canadian Standards Association (CSA)
- DEMKO A/S (D)
- European Low Voltage and Electromagnetic Compatibility Directives (CE)
- FIMKO LTD. (F)
- NEMKO A/S (N)
- Official Mexican Norms (NOM)
- SEMKO A/B (S)

- TÜV Product Service (TÜV)
- Underwriter's Laboratories, Incorporated (UL)
- United States Center for Devices and Radiological Health (CDRH)
- United States Federal Communications Commission (FCC)
- Voluntary Control Council for Intereference by Information Technology Equipment (VCCI)

Peligro de choque eléctrico

ADVERTENCIA: Para evitar el peligro de choque eléctrico, durante una tormenta eléctrica, no conectar ni desconectar los cables ni realizar la instalación, mantenimiento o reconfiguración de este producto.

Para evitar el peligro de choque eléctrico:

El cordón de alimentación eléctrica debe estar conectado a un receptáculo adecuadamente cableado y conectado a tierra.

Todo equipo al que se acoplará este producto debe estar conectado a receptáculos adecuadamente instalados.

Cuando sea posible, usar una mano para conectar o desconectar los cables de señales a fin de evitar un posible choque al tocar dos superficies con voltajes eléctricos diferentes.

La corriente eléctrica procedente de los cables de alimentación eléctrica, teléfono y comunicaciones es peligrosa. Para evitar el peligro de choques, seguir el procedimiento siguiente:

Para conectar

1. Acoplar los cables de señales a los receptáculos.
2. Acoplar el cordón eléctrico a un receptáculo adecuadamente conectado a tierra.

Para desconectar

1. Quitar el cordón eléctrico.
2. Quitar los cables de señales de los aparatos.

Declaración de la Federal Communications Commission (FCC)

NOTA: Este equipo ha sido probado y se ha encontrado que cumple con los límites de emisión de los aparatos digitales de la Clase A o de la Clase B según se identifica en la placa de identificación, conforme a la CFR 47, Parte 15 de las normas de la FCC. Estos límites se han diseñado para proveer protección razonable contra interferencias dañinas cuando el equipo funciona en un entorno comercial. Este equipo genera, usa, y puede emitir comunicaciones por radiofrecuencia. El funcionamiento de este equipo en un área residencial es muy posible que produzca interferencia perjudicial, en cuyo caso se exigirá al usuario que corrija la interferencia corriendo los gastos por su cuenta.

Se debe usar cables y conectores adecuadamente protegidos y con toma a tierra y los GBIC de la Clase A o B certificados por la FCC, para cumplir con los límites de emisión de la FCC especificados en la CFR 47, parte 15. Vixel no es responsable de las interferencias causadas al usar cables, conectores o GBIC diferentes a los recomendados o si se realizan cambios o modificaciones no autorizados para este equipo. Los cambios o modificaciones no autorizados podrían anular la autoridad para operar este equipo.

En caso de usar cables, conectores o GBIC diferentes a los recomendados, el usuario asume toda la responsabilidad para verificar que este equipo cumple con la CFR 47, Parte 15.

Este aparato cumple con la Parte 15 de las normas de la FCC. El funcionamiento está sujeto a las dos condiciones siguientes: (1) este aparato no debe causar interferencias dañinas, y (2) este aparato debe aceptar cualquier interferencia que reciba, inclusive las interferencias que puedan causar un funcionamiento indeseado.

Declaración de conformidad con la directiva de la Unión Europea

Este producto ha sido probado y se ha encontrado que cumple con los requisitos de protección de la Directiva 89/336/EEC del Consejo de la UE sobre la aproximación de las leyes de los estados miembros relacionadas con la compatibilidad electromagnética.

Atención: Este producto pertenece a la Clase A o B como se identifica en la placa de identificación. En un entorno doméstico, este producto puede causar interferencias de radio, en cuyo caso el usuario deberá tomar las medidas adecuadas.

APPENDIX B Glossary

AL_PA or Arbitrated Loop Physical Address	A one-byte value used to identify a port in an Arbitrated Loop topology. The value of the AL_PA corresponds to bits 7:0 of the 24-bit Native Address Identifier.
Arbitrated Loop	A Fibre Channel topology structured as a loop and requiring a port to successfully arbitrate prior to establishing a circuit to send and/or receive frames.
Arbitration	The process of selecting one respondent from a group requesting service at the same time.
Copper Cable	Cables used to connect storage modules and host-bus adapters with copper interfaces to copper GBICS. Best suited for intra-cabinet. Best cable types include twin-axial and equalized. Intra-cabinet copper cables should not exceed 13 meters.
Current Fill Word	The fill word that the Loop Port State Machine uses when a fill word is to be transmitted.
DB-9 Connector	Nine pin D sub-miniature connector used as an interface for Fibre Channel copper cabling.
Duplex Cable	Two fiber cables suitable for simultaneous transmission and reception.
Full-Duplex Transmission	Transmission in both directions, simultaneously (transmitting on one, receiving on the other).
Fiber Optics	Light transmission through optical fibers for communication or signaling
Fibre Channel	Fibre Channel is a gigabit per second data transfer interface technology that maps several common transport protocols including IP and SCSI, allowing it to merge high-speed I/O and networking functionality in a single connectivity technology. Fibre channel is an open standard as defined by ANSI and OSI standards and operates over copper and fiber optic cabling at distances of up to 10 Kilometers. It is unique in its support of multiple inter-operable topologies including point-to-point, arbitrated-loop and switching and it offers several qualities of service for network optimization. With its large packet sizes, Fibre Channel is ideal for storage, video, graphic and mass data transfer applications.

GBIC	GigaBit Interface Converter Module. Open Standard developed by Vixel Corp., Sun, Compaq, and Amp. Industry's first hot pluggable, gigabit transceiver.
HSSDC connector	High Speed Serial Data Connector. Used on GBICs and Host Bus Adapters.
Long-Wave	Refers to wavelength or frequency in the spectrum of light. Specified under Fibre Channel as 1310 nm is the operating range of long wavelength lasers. The maximum distance for Long-Wave is 10 kilometers over single mode cable.
Loop Port State Machine (LPSM)	A logical entity which performs the Arbitrated Loop specific protocols.
Mb/s	Megabits per second, 1,024,000 bits per second.
MB/s	Megabytes per second, 8,192,000 bits per second. One byte = 8 bits.
Multimode Fiber	An optical waveguide in which typical core/cladding sizes are 50/125 and 62.5/125 microns.
Node	An entity with one or more N_Ports or NL_Ports.
Non-OFC	Non Optical Fiber Control. A standard for eye safe use within the fiber industry. All switch and arbitrated loop hubs favor Non-OFC.
OFC	Optical Fiber Control. A safety interlock system that controls the optical power level in an open fiber optic cable. Not supported in GBICs.
Protocol	A data transmission convention which may include timing, control, formatting, error detection with correction and data representation.
SC Duplex Connector	Standard Fibre Channel terminating connector for fiber (short-wave and long-wave). Used to plug into GBIC and Host Bus Adapter.
SCSI	Small Computer System Interface. Standard interface for storage modules.
Short-Wave	Refers to wavelength or frequency in the spectrum of light. Specified under Fibre Channel as 780- 860 nm it is the operating range of short wavelength lasers. The maximum distance for Short-Wave is 500 meters.

Single Mode Fiber	An optional wave guide in which typical core/cladding sizes are 9/125 microns.
Topology	The logical and/or physical arrangement of stations on a network. Fibre Channel topologies include point-to-point, Arbitrated Loop, and switched fabric.

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