



INFINITYLINK ILC205



**9 Port Gigabit Ethernet Switch with VLAN
Installation and Operations Manual**



ILC205 Function Module

9 Port Gigabit Ethernet Switch with VLAN

Installation and Operations Manual

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Revision history for the *ILC205 Function Module Installation and Operations Manual*.

Table 0-1. Manual Revision History

Revision History			
Revision	Document Number	Date	Reason for Change
A	AR200-006105-10_A	December, 2016	Initial release.



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About This Manual

This manual provides instructions for installing, configuring, and operating the ILC205 function modules.

Audience

This manual is intended for the following trained and qualified service personnel who are responsible for installing and operating the ILC205 module:

- System installer
- Hardware technician
- System operator

Related Documentation

The following documentation contains material related to the ILC205 function modules:

Document	Provides . . .
<i>ILC205 Data Sheet</i>	Product operating and environmental specifications, and regulatory conformance information.
<i>ILC205 Quick Start Guide</i>	Product configuration information and descriptions of the front and rear panel status LED operations.
<i>InfinityLink IL6000 Chassis Manual</i>	Overview and installation instructions for the InfinityLink media transport platform chassis options, including the following: <ul style="list-style-type: none">• IL6000 chassis—Installation of this 4-slot chassis, power supplies, and function modules.
<i>InfinityLink IL6000 Chassis Data Sheet</i>	Overview of the InfinityLink media transport platform chassis options.
<i>InfinityLink Manager Setup and Operations Manual</i>	Overview and operating instructions for the InfinityLink Manager element management system.

Symbols and Conventions

This manual uses the following symbols and conventions.

Caution

A caution means that a specific action you take or fail to take could cause harm to the equipment or to the data transmission.



Warning

A warning describes an action you take or fail to take that could result in death, serious physical injury, or destruction of property.

Note: Important related information, reminders, and recommendations.

Italics—used for emphasis, for indicating the first occurrence of a new term, and for book titles

1. Numbered list—where the order of the items is important
 - Bulleted list—where the items are of equal importance and their order is unimportant

Artel Customer Service

You can reach Customer Service by e-mail at customer care@artel.com or by telephone:

In the US call (800) 225-0228, then select 1 for technical support.

Outside the US call (978) 263-5775, then select 1 for technical support.

When requesting assistance, please be ready to provide the following information:

- Your name and telephone number
- Product model and serial number
- Brief description of the problem
- List of symptoms
- Steps you have already taken to try to resolve the problem

If the product is damaged

If any portion of the unit is damaged, forward an immediate request to the delivering carrier to perform an inspection of the product and to prepare a damage report. Save the container and all packing materials until the contents are verified.

Concurrently, report the nature and extent of the damage to Artel Customer Service so that action can be initiated to either repair or replace the damaged items.

Do not return any items to Artel until you obtain instructions from Customer Service.

Report the problem or deficiency to Customer Service along with the model number and serial number. Upon receipt of this information, Artel will provide service instructions, or a *Return Authorization Number* and shipping information.

ILC205 Function Modules

Ethernet Aggregators and Optical Transceivers

Information About the ILC205 Modules

Note: The installation and operation of the ILC205 module is similar regardless of the Artel chassis model that hosts the module. This manual points out any differences where needed.

This manual introduces the ILC205 function module and includes information for installing and configuring them. The ILC205 module aggregates local IP traffic and video-over-IP traffic from other Artel host chassis function and management modules, requiring fewer wired or optical connections to external networks.

Additional features include the following:

- Nine-port, layer 2 Ethernet switch.
- Five external 1 gigabit Ethernet (1 GigE) ports as follows:
 - Three 10/100/1000 Mb/s RJ45 connectors that support auto-MDIX and negotiation.
 - Two small form-factor pluggable (SFP) ports that can provide two bidirectional links between a pair of ILC205 modules or to an optical Ethernet switch. These ports allow redundant optical links, an optical repeater function, or additional copper ports by using RJ45 SFPs.
- Four internal 1 GigE ports to the backplane.
- VLAN tagging and trunking capabilities.

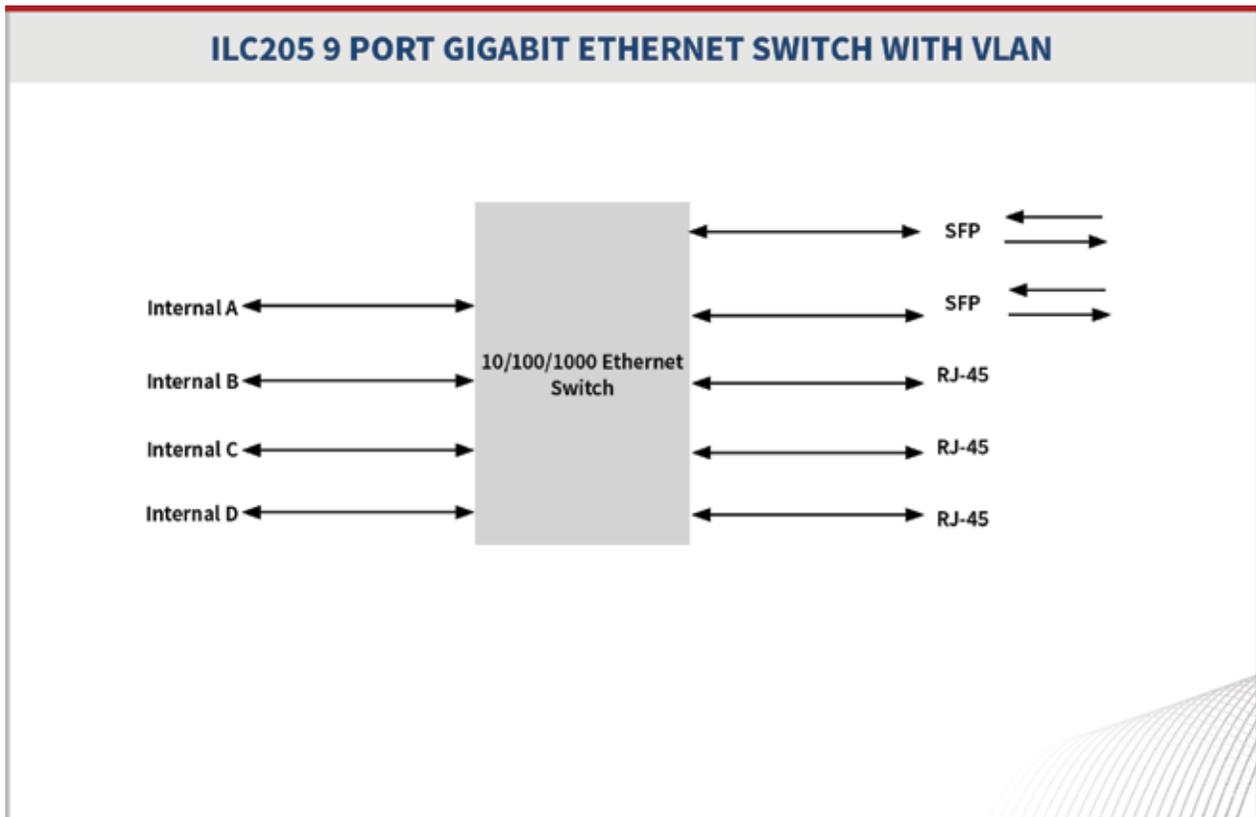
You provision and monitor the ILC205 modules as follows:

- Provision and monitor the module remotely using InfinityLink Manager running on a chassis power supply module). For more information, see the *InfinityLink Manager Setup and Operations Manual*.
- Monitor the module locally using the front and rear panel status LEDs.

ILC205 Modules Functional Descriptions

This section provides a functional description of the ILC205 module, including [Figure 1](#), which is a functional block diagram of the module.

Figure 1. ILC205 Module Functional Block Diagram



Electrical/Optical Inputs and Outputs

The ILC205 module uses the following inputs and outputs:

- Three rear panel RJ45 connectors.
- Two rear panel SFP sockets for either of the following:
 - Two optical connections
 - Two additional RJ45 connections
- Four sets (transmit/receive) of backplane connections for sharing signals with other host chassis modules.

Overview of the ILC205 Module

This section provides an overview of the components that make up the ILC205 module.

Figure 2. ILC205 Module Major Components

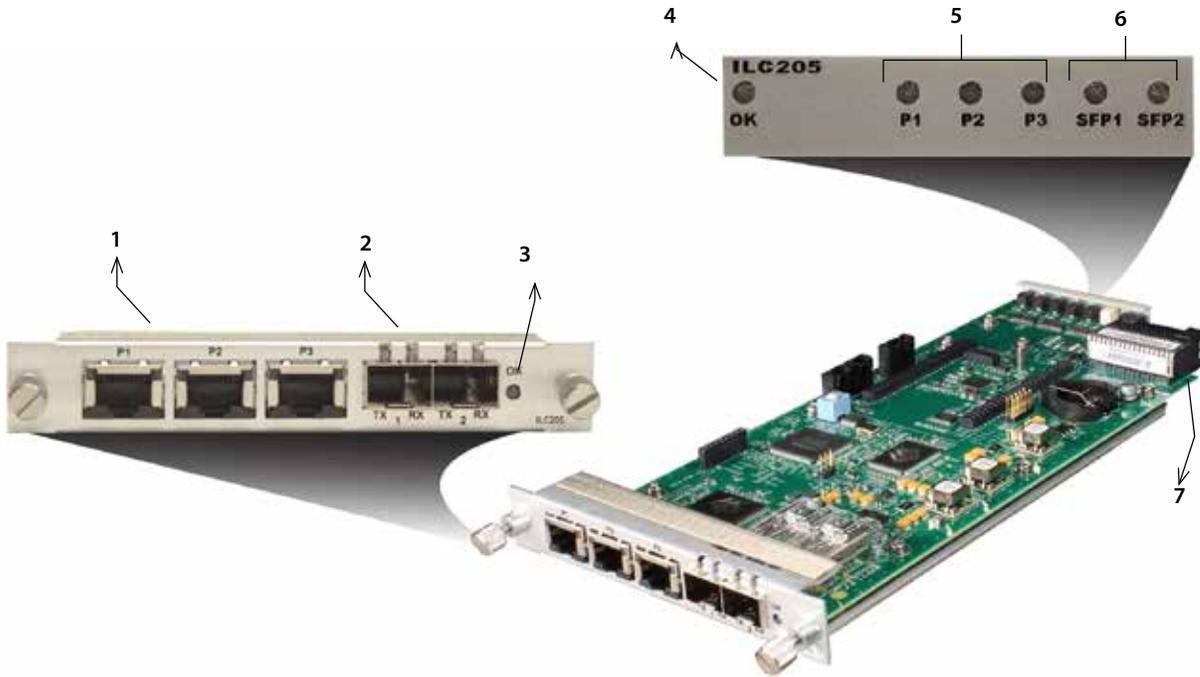


Table 1. ILC205 Elements

Item	Module Element	for details, see...
1	RJ45 connectors P1, P2, and P3.	<ul style="list-style-type: none"> Cabling the Data Input RJ45 Connections (page 6) Understanding the Rear Panel Status LEDs (page 14)
2	SFP sockets SFP1 and SFP2.	<ul style="list-style-type: none"> Cabling the SFP Connections (page 6) Understanding the Rear Panel Status LEDs (page 14)
3	Rear panel alarm indicator OK LED.	Understanding the Rear Panel Status LEDs (page 14)

Table 1. ILC205 Elements (Continued)

Item	Module Element	for details, see...
4	Front panel alarm indicator OK LED.	Understanding the Front Panel Status LEDs (page 13)
5	Front panel status LEDs for RJ45 connectors P1, P2, and P3.	
6	Front panel status LEDs for SFP connectors SFP1 and SFP2.	
7	Backplane connector that provides power to the module, allows the module to share signals with other function modules, and is used for alarm and management signals.	N/A

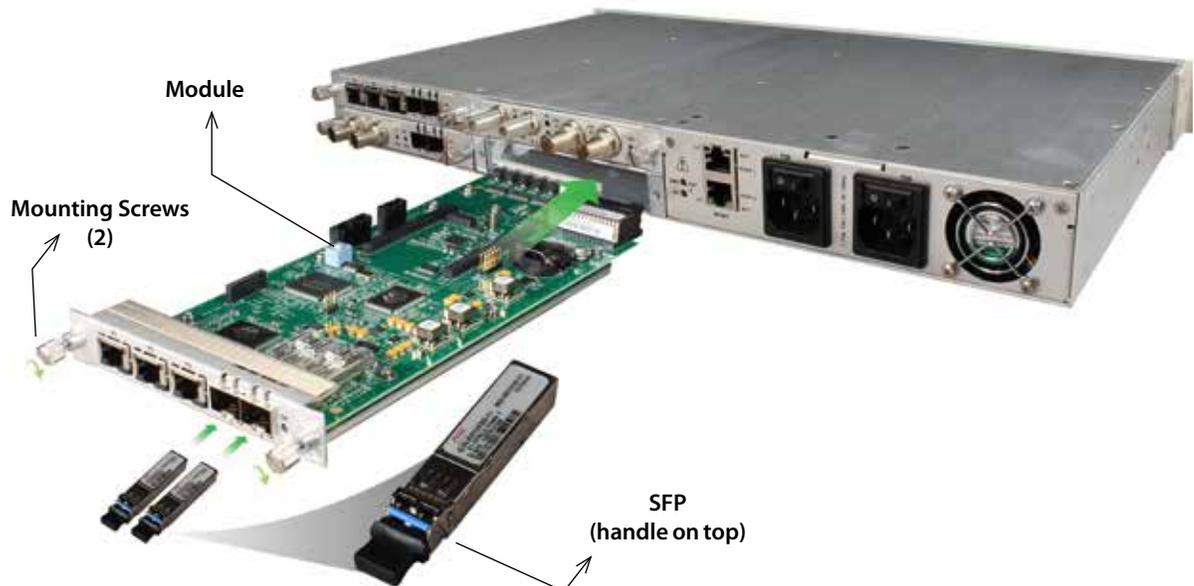
Installing the ILC205 Module

The ILC205 module and associated SFPs are hot swappable, enabling you to safely install them while power is applied to the host chassis. Before you install the module, see the ILC205 data sheet for a detailed description of the module specifications including environmental requirements that you must adhere to when installing the module.

To install the ILC205 module in the host chassis (see [Figure 3](#)), perform the following steps:

1. From the back of the chassis, remove the two screws that secure the blank tray to the unused function module slot.
Use any available function module slot.
2. Slide the module into the chassis slot using the printed circuit board guide rails on either side of the slot.
3. Push the module in until it is firmly seated into the backplane and flush with the chassis.
4. Tighten the two mounting screws that secure the module to the chassis.
5. Install the Artel-approved SFPs in the module (handle on top as shown in [Figure 3](#)).
Push the SFP into the socket located on the right side of the function module until it is firmly seated into the socket.
6. Insert a blank tray in any unused chassis module slots to maintain proper ventilation.

Figure 3. ILC205 Module and SFP Installation



Cabling the ILC205 Modules

This section describes how to cable the external connections of the ILC205 module, which can receive external signals over its RJ45 connectors and SFPs. The SFPs, which can also be used for transmitting external signals, can be optical (LC connectors) or electrical (RJ45 connectors). The cabling configuration that you use depends on your application.

Figure 4. ILC205 RJ45 Connectors and SFP Sockets



Cabling the Data Input RJ45 Connections

Use Ethernet cables with RJ45 plugs to connect the module's RJ45 connectors to the source or destination devices.

Cabling the SFP Connections

When using optical SFPs, use a single mode fiber when connecting to the LC connectors of the SFPs.

To cable the optical connections, perform the following tasks:

1. Remove the SFP safety plug that protects the TX/RX ports.
Cover any unused optical port to keep the port clean.
2. Connect the fiber optic cable between the SFP optical connectors on the module and the external source or destination device.

Configuring the Module with InfinityLink Manager

You configure the ILC205 module operation using the InfinityLink Manager element management system and the module's configuration page.

Guidelines

You can configure the ILC205 Ethernet module to act as either a simple 802.3 switch or as a 802.3ac VLAN-aware switch. This configuration setting applies to all ports. With VLAN support enabled, you can enable double tagging (referred to as *QinQ*) on a single trunking interface. Double tagging inserts a second tag, known as the *provider tag*, that is formed from the Ether Type configured and the PVID associated with the frames ingress port. This feature is intended to be used in conjunction with third-party provider backbones that isolate each customer's traffic based on unique tags. The inner tag is copied from the original tagged frame and is called the *Customer tag*. Untagged traffic can not be transported over a configured QinQ link, but can still pass between other ports on the module if needed.

Another key component of VLANs is the ability to prioritize traffic. This can be accomplished by attached devices that send 802.1Q tagged frames with a tag and priority defined or by configuring the module to add a default VLAN ID and priority on a port-by-port basis. The modules include four queues that are mapped to the 802.1Q priorities (see [Table 4](#)). The module uses a strict priority scheduling algorithm that forwards frames only when no higher priority frames are in the queue. Keeping the MGMT VLAN priority at the highest priority (7) will help maintain your management connectivity over congested links.

Caution

Do not modify the VLAN configuration in such a way as to block your management traffic path.

Prerequisites

To configure the ILC205 module, you must access the InfinityLink Manager that manages the module. For details about accessing and setting up InfinityLink Manager, see the *InfinityLink Manager Setup and Operations Manual*.

Procedure

To configure the ILC205 module operation, perform the following steps:

1. From a browser window, enter the IP address of the InfinityLink Manager that manages the module.
The Home page displays.
2. From the Home page menu bar, click **Shelf View**.
The Shelf View page displays, which shows the rear chassis panel along with the Installed Modules table.
3. From the Installed Modules table, click the **Configuration** link associated with the ILC205 listed in the Module Type column.
The Configuration page displays.
4. From the Physical Layer Configuration panel, configure the module's physical port connections as described in the following table.

Table 2. Physical Layer Configuration Parameters

Parameter	Setting	Description
P1 to P3 (RJ45 connectors)	Enable (Check/Uncheck)	Check the checkbox to enable the port or uncheck it to disable the port. The default is Enabled .
	Rate Limit	Select the appropriate port rate limit: 1 Gb/s, 100 Mb/s, 10 Mb/s, or Auto . The default is Auto or auto-MDIX and auto-negotiation.
	Duplex Limit	Select the appropriate duplex setting: Full or Half . The default is Full duplex.
	Enable Alarms (Check/Uncheck)	Check the checkbox to enable the alarm feature. Uncheck the checkbox to disable the alarm feature. The default is Disabled .
SFP1 and SFP2	Enable	Check the checkbox to enable the port or uncheck it to disable the port. The default is Enabled . Note: The rate limit for the SFP ports is set to 1 Gb and cannot be modified.
	Enable Alarms	Check the checkbox to enable the alarm feature. Uncheck the checkbox to disable the alarm feature. The default is Disabled .
BP1 to BP4 (backplane connections)	Selectable	Use the drop-down boxes to select a backplane connection for Channels A to D. This step sets up a connection between the selected backplane connection and the rear panel connections. The connection options that display varies depending on the module types that the host chassis contains.

5. From the Virtual Layer Configuration panel, configure the virtual layer parameters for each of the module's ports as described in the following table.

Table 3. Virtual Layer Configuration Parameters

Parameter	Setting	Description
Trunk Select	Selectable	<p>Select a single interface for QinQ traffic. If QinQ is not enabled, then this setting has no affect. Only the selected VLAN Memberships will be forwarded over the trunk. Use of the PVID for untagged traffic is not allowed.</p> <p>Select the None option to disable trunking,</p>
VLAN Membership	Check/Uncheck (A to H and MGMT)	<p>Use the A to H checkboxes to specify the port's VLAN membership. VLAN membership selections, in conjunction with the PVID entry, control which frames can egress a particular port and whether the frames will have a tag added or stripped. When there are conflicting rules pertaining to a specific VID, the untagged PVID takes priority.</p> <p>Guidelines</p> <p>If a port has membership in an enabled VLAN, then traffic tagged with a matching VLAN ID ingresses and the following actions may occur:</p> <ul style="list-style-type: none"> • Tagged traffic that ingresses this port may egress any port that is a tagged member of the VLAN with which the packets are tagged. This traffic will egress tagged. • Tagged traffic that ingresses this port may egress any port that has a PVID that matches the VLAN ID with which these packets are tagged. This traffic will egress untagged. • If this traffic egresses a port which is both a member of the VLAN with which these packets are tagged and has PVID matching that VLAN ID, this traffic will egress untagged. • Untagged traffic will be discarded on ingress if this port has a PVID of 0.

Table 3. Virtual Layer Configuration Parameters (Continued)

Parameter	Setting	Description														
Untagged Membership	PVID	<p>Specify a port VLAN ID (PVID). The valid range is 0 to 4095 where 0 signifies no PVID assigned. The default is 1.</p> <p>Guidelines</p> <ul style="list-style-type: none"> • If you enter a PVID of 0 and this port is not a member of an enabled VLAN, then no traffic can ingress or egress using this port. • Any untagged traffic may ingress a port that has a PVID other than 0 assigned to it. • Untagged traffic that ingresses via this port may egress from any port with a matching PVID. This traffic will egress untagged. • Untagged traffic that ingresses via this port may also egress through any port that is a member of an enabled VLAN whose VLAN ID matches this ports PVID. This traffic will egress tagged. • Tagged traffic may ingress using this port if it is tagged with a VLAN ID which matches this port's PVID. <p>Note: Tagged traffic may egress untagged from any port whose PVID matches this port PVID. This traffic may egress tagged from any port that has a PVID not matching this port PVID and that is a member of an enabled VLAN whose VLAN ID matches this port PVID.</p>														
	Priority	<p>From the drop-down list, select a VLAN priority level of 0 to 7 (as defined in 802.1Q) with 7 being the highest priority. The default is 0.</p> <p>Because the internal switch hardware has only four output queues used to implement QoS (values 0 to 3), two 802.1Q priority values are mapped to a unique internal QoS queue priority value as shown in the following table:</p> <p>Table 4. Priority Mapping</p> <table border="1" data-bbox="889 1388 1292 1829"> <thead> <tr> <th>802.1Q Priority</th> <th>QoS Queue Priority</th> </tr> </thead> <tbody> <tr> <td>0</td> <td rowspan="2">0</td> </tr> <tr> <td>1</td> </tr> <tr> <td>2</td> <td rowspan="2">1</td> </tr> <tr> <td>3</td> </tr> <tr> <td>4</td> <td rowspan="2">2</td> </tr> <tr> <td>5</td> </tr> <tr> <td>6</td> <td rowspan="2">3</td> </tr> <tr> <td>7</td> </tr> </tbody> </table>	802.1Q Priority	QoS Queue Priority	0	0	1	2	1	3	4	2	5	6	3	7
802.1Q Priority	QoS Queue Priority															
0	0															
1																
2	1															
3																
4	2															
5																
6	3															
7																

6. From the 802.1Q panel, configure the 802.1Q parameters as described in the following table (see also [Guidelines](#)).

Table 5. 802.1Q802.1Q Configuration Parameters

Parameter	Setting	Description
VLANs	Enable	Enable VLAN support.
	Disable	Disable VLAN support. This is the default setting.
Trunk QinQ Tagging	Enable	Enable trunk QinQ tagging support for the trunk ports selected in the Virtual Layer Configuration panel. <p>Guidelines</p> <ul style="list-style-type: none"> When QinQ is enabled and a port is selected as a trunk port, all traffic that egresses that port is tagged with a VLAN ID that matches the PVID of the port whereby the packet ingresses the switch. If the packets are untagged they will egress with a single tag. If the packets are already tagged they will be double tag. The Ether Type of the tags added by the trunk port can be either 0x8100 or 0x88A8 (see the QinQ Ether Type parameter described below). Packets that ingress this port will have the first tag in the packet removed as follows: <ul style="list-style-type: none"> Double tagged packets will have their outer tag removed and be routed based on their remaining tag. Single tagged packets will have their tag removed and not be able to egress the switch. Only one port may be designated as a trunk port.
	Disable	Disable trunk QinQ tagging support for the trunk ports selected in the Virtual Layer Configuration panel. This is the default setting.
QinQ Ether Type	Variable	Specify the QinQ Ether Type. The valid range is 0x0001 to 0xffff . The default is 0x88a8 .

7. From the VLAN IDs panel, configure the VLANs as described in the following table.

Table 6. VLAN Configuration Parameters

Parameter	Setting	Description
Enable	Check/Uncheck	Check the checkbox to enable VLAN ID across all port memberships or uncheck it to disable this feature. The default is Disabled (unchecked).

Table 6. VLAN Configuration Parameters (Continued)

Parameter	Setting	Description
VLAN ID	Variable	Specify the VLAN ID. The valid range is 1 to 4095 . The VLAN ID value assigned to all aliases must be unique if they are enabled. The VLAN ID and the PVID do not have to be unique. The default is 1 .
Priority	Variable	Specify the Management Alias Priority. The valid range is 0 to 7 if present.
Name	Variable	Name for each VLAN as specified using the Edit Labels menu from the Module Status page.

Note: For VLAN settings to take effect, you must enable VLANs in the 802.1Q panel as described in [Step 6](#).

- Click **Submit**.

The configuration is saved.

Monitoring ILC205 Operations

This section describes how to monitor ILC205 operations using the front and rear panel status LEDs or InfinityLink Manager and contains the following topics:

- [Monitoring Using the Module Panel LEDs \(page 13\)](#)
- [Monitoring Using InfinityLink Manager \(page 15\)](#)

Monitoring Using the Module Panel LEDs

This section describes how to monitor the module's operations using the front and rear panel LEDs.

- [Understanding the Front Panel Status LEDs \(page 13\)](#)
- [Understanding the Rear Panel Status LEDs \(page 14\)](#)

Understanding the Front Panel Status LEDs

[Table 7](#) describes the states of the ILC205 front panel status LEDs as shown in [Figure 5](#).

Figure 5. ILC205 Front Panel Status LEDs

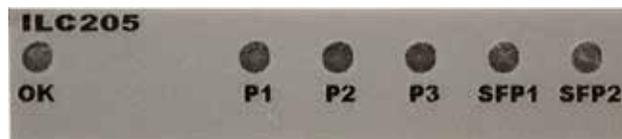


Table 7. ILC205 Front Panel Status LEDs

LED	Indicates ...	State	Description
OK	Module status	Off	If power is applied to the system, an internal fault with the module may exist.
		Green	Normal operation.
		Yellow	Minor alarm condition exists.
		Red	Major alarm condition exists.

Table 7. ILC205 Front Panel Status LEDs (Continued)

LED	Indicates ...	State	Description
P1/P2/P3	RJ45 port status	Off	Port disabled.
		Green	Link established.
		Green (flashing)	Link established with data activity.
		Red (flashing)	Loss link alarm, if enabled.
SFP1/SFP2	SFP port status	Off	No SFP installed or SFP disabled.
		Green	Link established, no activity.
		Green (flashing)	Link established with data activity.
		Yellow (flashing)	RX optical power high.
		Red	TX/RX fault, or RX low optical power.
		Red (flashing)	Loss link alarm, if enabled.

Understanding the Rear Panel Status LEDs

Table 8 describes the states of the ILC205 rear panel status LEDs as shown in Figure 6.

Figure 6. ILC205 Rear Panel Status LEDs



Table 8. ILC205 Front and Rear Panel Status LEDs

LED	Indicates ...	State	Description
OK	Module status	--	Same operation as the front panel OK LED (see Table 7).
P1/P2/P3 Link	Port status	Off	Port disabled.
		Green	Link established.
P1/P2/P3 Activity	Port activity	Off	Port disabled.
		Green	Activity on link.
SFP1/SFP2 TX	SFP laser status	Off	No SFP installed or SFP disabled.
		Green	Normal operation.
		Red	SFP TX fault.

Table 8. ILC205 Front and Rear Panel Status LEDs (Continued)

LED	Indicates ...	State	Description
SFP1/SFP2 RX	SFP link status	Off	SFP disabled.
		Green	Link established.
		Green (flashing)	Data activity.
		Yellow (flashing)	RX optical power high.
		Red (flashing)	SFP RX fault, low light, or loss of signal.
		Red	Loss link alarm, if enabled.

Monitoring Using InfinityLink Manager

This section shows how to use InfinityLink Manager to view the module's current configuration, major and minor alarm status, and the optical status of SFP1 and SFP2.

Prerequisites

To monitor the ILC205 module using InfinityLink Manager, you must access the InfinityLink Manager that manages the module. For details about accessing and setting up InfinityLink Manager, see the *InfinityLink Manager Setup and Operations Manual*.

Procedure

To monitor the ILC205 module operation, perform the following steps:

- From a browser window, enter the IP address of the InfinityLink Manager that manages the module.
The Home page displays.
- From the Home page menu bar, click **Shelf View**.
The Shelf View page displays, which shows the rear chassis panel along with the Installed Modules table.
- From the Installed Modules table, click the **ILC205** link listed in the Module Type column.
The Module Status page displays, which shows the following information:
 - Current Configuration:** Displays the following information for the rear panel's RJ45 connectors, Ports 1 to 3:
 - Link**—Line status: UP or DOWN.
 - Rate Limit**—Configured setting: 1 GB/S, 100 MB/S, 10 MB/S, AUTO (auto-negotiate)
 - Rate**—Detected rate.
 - Duplex Limit**—Configured setting: FULL or HALF DUPLEX.
 - Duplex**—Detected duplex usage.
 - Alarms**—Configured setting: Enabled or Disabled.
 - Alarms:** Displays detected Major and Minor alarm conditions if any exist.

- **Optical Status:** Displays the current optical operating status of the rear panel SFP1 and SFP2. Possible status conditions are as follows:
 - SFP: NOT PRESENT
 - LINK ESTABLISHED, NO ACTIVITY
 - LINK ESTABLISHED WITH DATA ACTIVITY
 - RX OPTICAL POWER HIGH
 - TX/TX FAULT OR RX LOW OPTICAL POWER
 - LOSS LINK ALARM, IF ENABLED

Removing an SFP or Module

You can safely remove either the SFP from a ILC205 module, or the module from the host chassis while power is applied to the module.

This section contains the following topics:

- [Removing an SFP \(page 17\)](#)
- [Removing a Module \(page 17\)](#)

Removing an SFP

To remove the SFP from a ILC205 module, perform the following steps:

1. Remove the fiber optic cables from the SFP.
2. Pull down on the SFP handle to dislodge it from the module.
3. Using the SFP handle, pull the SFP out of the module.

Removing a Module

To remove a ILC205 module from the host chassis, perform the following steps:

1. Remove the Ethernet cables from the P1 - P3 RJ45 ports.
2. Remove the fiber optic cables from the SFPs.
3. Loosen the two mounting screws that secure the module to the host chassis.
4. Using the two mounting screws, pull the module out of the host chassis.

Caution

To avoid problems associated with overheating, do not leave a function module slot open when power is applied to the chassis. Every module slot must contain a module or blank tray to ensure proper ventilation when power is applied.

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