



Product Overview

This chapter describes the Cisco Connected Grid Ethernet Switch Module Interface Card, hereafter referred to as the switch module. The switch deployed together with the Cisco 2010 Connected Grid Router (CGR 2010) offers utilities a rugged networking solution to enable reliable and secure two-way communication for substation automation.




Note

The Cisco CGR 2010 router must be running Cisco IOS Release 15.1(4)M or higher to run the switch module.

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Switch Models

Table 1-1 *Connected Grid Ethernet Switch Module Interface Card Models*

Mode	Description
GRWIC-D-ES-6S (SFP fiber model)	4 100 Mb/s SFP (small form-factor pluggable) module slots, 1 Gigabit Ethernet (GE) dual-purpose port (1 10/100/1000BASE-T port and 1 100/1000 Mb/s SFP module slot), 1 100/1000 M/bs SFP module slot.
GRWIC-D-ES-2S-8PC (Copper model)	8 10/100BASE-T ports, 1 GE dual-purpose port (1 10/100/1000BASE-T port and 1 100/1000 Mb/s SFP module slot), 1 100/1000 Mb/s SFP module slot.
	 <p>Note The first four 10/100BASE-T ports (FE0/1, FE0/2, FE0/3, FE0/4) are PoE+¹ ports.</p>

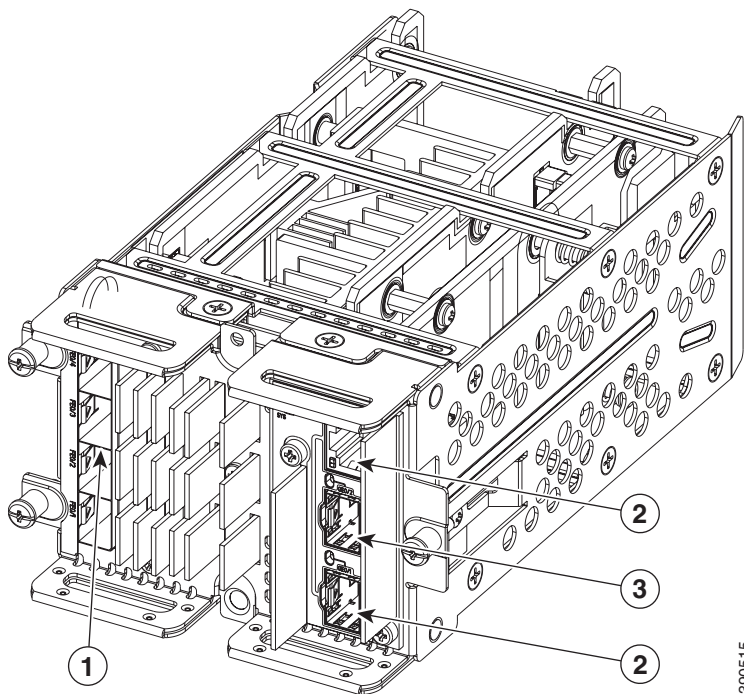
1. PoE+ = Power over Ethernet plus (provides up to 30 W per port).

Ports

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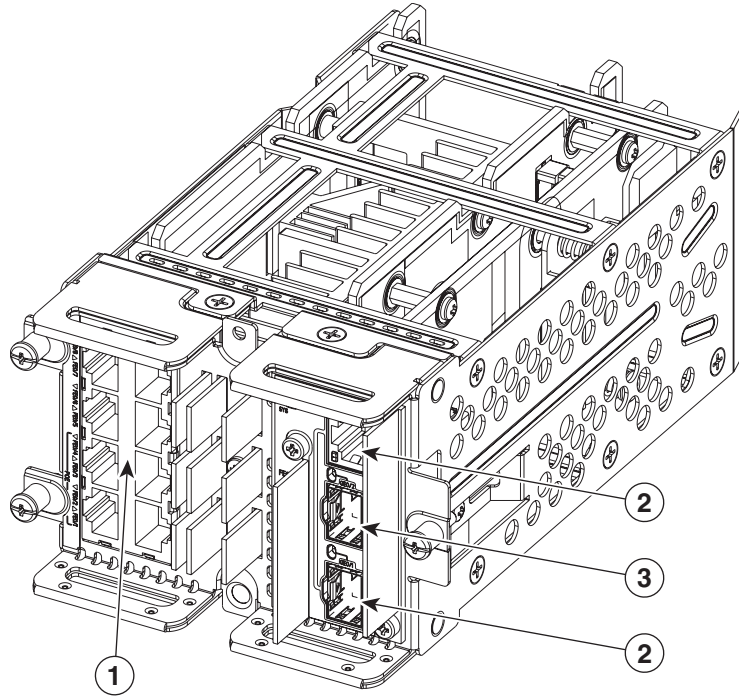
Port Locations

Figure 1-1 GRWIC-D-ES-6S (SFP Fiber Model)



1	10/100 Mb/s SFP module slots
2	Dual-purpose port
3	100/1000 Mb/s SFP module slot

Figure 1-2 GRWIC-D-ES-2S-8PC (Copper Model)



1	10/100BASE-T ports
2	Dual-purpose port
3	100/1000 Mb/s SFP Port

Port Labeling

The port labeling for the switch modules is described in [Table 1-2](#) and [Table 1-3](#).

Table 1-2 GRWIC-D-ES-6S Port Labeling

Port	Label
4 10/100 Mb/s SFP module slots	FE0/1, FE0/2, FE0/3, FE0/4
Dual-purpose port (10/100/1000BASE-T port and 100/1000 Mb/s SFP module slot)	GE0/1
100/1000 Mb/s SFP module slot	GE0/2

Table 1-3 GRWIC-D-ES-2S-8PC Port Labeling

Port	Description
8 10/100BASE-T ports	FE0/1, FE0/2, FE0/3, FE0/4, FE0/5, FE0/6, FE0/7, FE0/8
Dual-purpose port (10/100/1000BASE-T port and 100/1000 Mb/s SFP module slot)	GE0/1
100/1000 Mb/s SFP module slot	GE0/2

10/100BASE-T Ports

You can set the 10/100BASE-T ports on the switch to operate in any combination of half duplex, full duplex, or 10 or 100 Mb/s. You can set the ports for speed and duplex auto-negotiation. The default setting is auto-negotiate.

When set for auto-negotiation, the switch determines the speed and duplex settings of the attached device, and advertises its own capabilities. If the connected device also supports auto-negotiation, the switch negotiates the best connection (the fastest line speed that both devices support and full-duplex transmission if the attached device supports it), and configures itself accordingly. In all cases, the attached device must be within 328 feet (100 meters).

The 10/100BASE-T ports use RJ-45 connectors with Ethernet pinouts. The maximum cable length is 328 feet (100 meters). The 100BASE-TX traffic requires Category 5, Category 5e, or Category 6 unshielded twisted pair (UTP) cable. The 10BASE-T traffic can use Category 3 or Category 4 UTP cable.



Note

On the GRWIC-D-ES-2S-8PC switch module, the first four 10/100 Fast Ethernet ports (FE0/1, FE0/2, FE0/3, FE0/4) are PoE+ ports.

PoE and PoE+ Ports

The first four 10/100 Fast Ethernet ports (FE0/1, FE0/2, FE0/3, FE0/4) on the GRWIC-D-ES-2S-8PC switch module are PoE+ ports.



Warning

Voltages that present a shock hazard may exist on Power over Ethernet (PoE) circuits if interconnections are made using uninsulated exposed metal contacts, conductors, or terminals. Avoid using such interconnection methods, unless the exposed metal parts are located within a restricted access location and users and service people who are authorized within the restricted access location are made aware of the hazard. A restricted access area can be accessed only through the use of a special tool, lock and key or other means of security. Statement 1072

These PoE+ ports provide:

- Support for IEEE 802.3af-compliant powered devices (up to 15.4 W PoE per port) and support for IEEE 802.3at-compliant powered devices (up to 30 W PoE+ per port).
- Support for prestandard Cisco powered devices.
- Configurable support for Cisco intelligent power management, including:
 - enhanced power negotiation

- power reservation
- per-port power policing

On the GRWIC-D-ES-2S-8PC model (Copper model), the first four 10/100BASE-T ports (FE0/1, FE0/2, FE0/3, FE0/4) are PoE+ ports. A maximum of two PoE+ ports or four PoE ports can be supported at one time.

For information about configuring and monitoring PoE/PoE+ ports, see the “Interface Configuration” chapter of the *Cisco Connected Grid Ethernet Switch Module Interface Card Software Configuration Guide* on Cisco.com.

For information about port connections and port specifications, see the “Connecting Devices to the Switch Module” section on page 4-4 and the “Cable and Connectors” appendix.

**Note**

The output of the PoE+ circuit has been evaluated as a Limited Power Source (LPS) per IEC 60950-1.

10/100 Mb/s SFP Module Slots

The IEEE 802.3u 100 Mb/s SFP module slots provide full-duplex 100 Mb/s connectivity over multi-mode (MM) fiber cables or single-mode (SM) fiber cables. These ports use a SFP fiber-optic transceiver module that accepts a dual LC connector. Check the SFP specifications for the cable type and length.

100/1000 Mb/s SFP Module Slots

The IEEE 802.3u 1000 Mb/s SFP module slots provide full-duplex 100 or 1000 Mb/s connectivity over multi-mode (MM) fiber cables or single-mode (SM) fiber cables. These ports use a SFP fiber-optic transceiver module that accepts a dual LC connector. Check the SFP specifications for the cable type and length.

Dual-Purpose Gigabit Ethernet Ports

You can configure the dual-purpose ports on the switch as either 10/100/1000 Ethernet ports or as SFP module ports. You can set the 10/100/1000 Ethernet ports to autonegotiate, or you can configure them as fixed 10, 100, or 1000 Mb/s Ethernet ports.

By default, the switch selects the medium for each dual-purpose port (10/100/1000BASE-T or SFP). When a link is achieved on one media type, the switch disables the other media type until the active link goes down. If links are active on both media, the SFP module port has priority, but you can use the **media-type** interface configuration command to manually designate the port as an RJ-45 port or an SFP port.

You can configure the speed and duplex settings consistent with the selected media type. For information on configuring interfaces, see the “Interface Configuration” chapter of the *Cisco Connected Grid Ethernet Switch Module Interface Card Software Configuration Guide* on Cisco.com.

For more information on the SFP module ports see the “Supported SFPs” section on page 1-6 and the information on the SFP modules connectors and cables in the “Cable and Connectors” appendix.

Supported SFPs

Table 1-4 describes the supported SFP modules.



Note

The following SFP module slot points should be noted:

- The four 100 Mb/s FE SFP module slots of the Fiber model can only support 100FX connections.
- The 100/1000 Mb/s SFP module slots support both 100FX and 1000Base-X connections.

Table 1-4 Supported SFP Models

Type of SFP Module	Model
Rugged and Industrial SFPs -40 to 140°F (-40 to 60°C)	<ul style="list-style-type: none"> • GLC-SX-MM-RGD • GLC-LX-SM-RGD • GLC-ZX-SM-RGD • GLC-FE-100LX-RGD • GLC-FE-100FX-RGD
Commercial SFPs 32 to 113°F (0 to 45°C)	<ul style="list-style-type: none"> • GLC-BX-U with digital optical monitoring (DOM) support • GLC-BX-D with DOM support • GLC-FE-100LX • GLC-FE-100BX-D • GLC-FE-100BX-U • GLC-FE-100FX • GLC-FE-100EX • GLC-FE-100ZX • CWDM-SFP with DOM support
Extended temperature SFPs 23 to 140°F (-5 to 60°C)	<ul style="list-style-type: none"> • SFP-GE-S with DOM support • SFP-GE-L with DOM support • SFP-GE-Z with DOM support • GLC-EX-SMD with DOM support



Note

SFP module GLC-FE-100FX-RGD requires Version 2 to operate correctly in the switch module. After installing this SFP, you may receive the following message:

```
PLATFORM-4-SFP_REVISION_WARNING: Interface <interface> has an obsolete SFP module that is not recommended for this product.
```

This is a software warning that occurs when detecting an older version of SFP module GLC-FE-100FX-RGD, which has been replaced with an updated version (Rev. 2).

The recommended action is to replace this SFP module with the latest Cisco certified version of this SFP. The switch module requires Rev. 2 or higher of this SFP for optimum operation over the entire operating temperature range. To check the VID for the revision number, use the **show inventory** command.

LEDs

This section describes the location and function of the LEDs on the switch module.

Figure 1-3 GRWIC-D-ES-6S Switch Module (SFP Fiber Model) LEDs

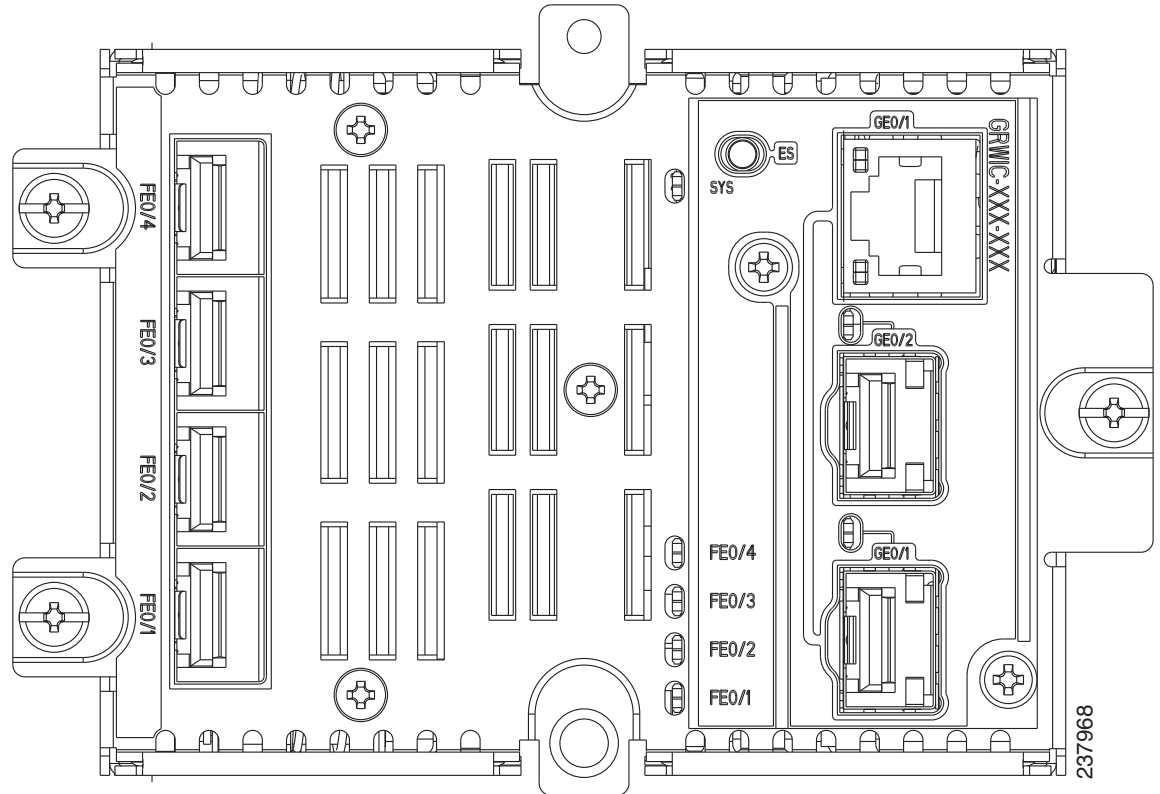
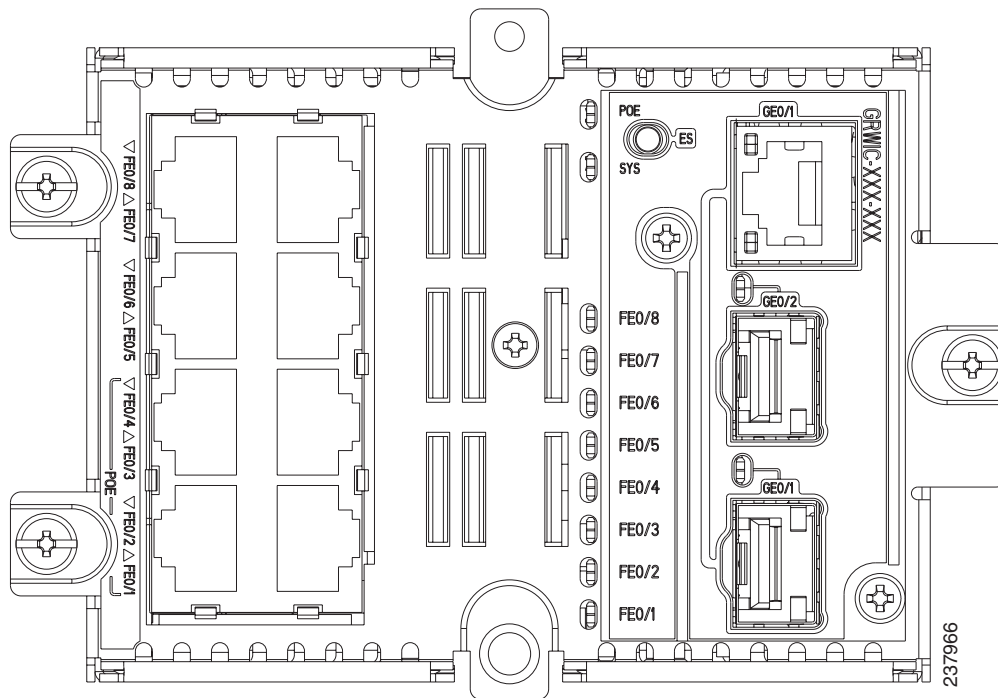


Table 1-5 GRWIC-D-ES-6S Switch Module (SFP Fiber Model) LED Descriptions

LED	Description
SYS	Indicates the status of the switch module. If the LED is yellow, check the Syslog for issues.
FE0/1 to FE 0/4	Indicates the state of the 100 Mb/s SFP module slots: <ul style="list-style-type: none"> LED is flashing green—data transmission is taking place. LED is off—the link is down. LED is solid yellow—the port is in an error state (disabled).

Table 1-5 GRWIC-D-ES-6S Switch Module (SFP Fiber Model) LED Descriptions (continued)

LED	Description
GE0/1	Indicates the state of the Gigabit Ethernet dual purpose port: <ul style="list-style-type: none"> • LED is flashing green—data transmission is taking place. • LED is off—the port is down. • LED is solid yellow—the port is in an error state (disabled).
GE0/2	Indicates the state of the 1000 Mb/s SFP module slot: <ul style="list-style-type: none"> • LED is flashing green—data transmission is taking place. • LED is off—the port is down. • LED is solid yellow—the port is in an error state (disabled).

Figure 1-4 GRWIC-D-ES-2S-8PC Switch Module (Copper Model) LEDs**Table 1-6 GRWIC-D-ES-2S-8PC Switch Module (Copper Model) LED Descriptions**

LED	Description
PoE	Indicates if PoE/PoE+ is functioning. The four PoE-capable ports are FE0/1, FE0/2, FE0/3, and FE0/4.
SYS	Indicates the status of the switch module. If the LED is yellow, check the Syslog for issues.

Table 1-6 *GRWIC-D-ES-2S-8PC Switch Module (Copper Model) LED Descriptions (continued)*

LED	Description
FE0/1 to FE 0/8	Indicates state of the Fast Ethernet ports: <ul style="list-style-type: none"> • LED is flashing green—data transmission is taking place. • LED is off—the link is down. • LED is solid yellow—the port is in an error state (disabled).
GE0/1	Indicates the state of the Gigabit Ethernet dual purpose port: <ul style="list-style-type: none"> • LED is flashing green—data transmission is taking place. • LED is off—the port is down. • LED is solid yellow—the port is in an error state (disabled).
GE0/2	Indicates the state of the 1000 Mb/s SFP module slot: <ul style="list-style-type: none"> • LED is flashing green—data transmission is taking place. • LED is off—the port is down. • LED is solid yellow—the port is in an error state (disabled).

Router Compact Flash Memory Cards

Compact flash cards can help you configure new or replacement routers, and to recover the configuration of a failed router. For example, if the Connected Grid Swap Drive feature is enabled, you can transfer the same system configuration information from one router to another by using a compact flash memory card (or compact flash card) while the routers are operating. This is done by inserting an optional compact flash card in slot CF1 and copying all contents of CF0. After the copy operation is completed, you can remove and insert this compact flash card unit in slot CF0 of either a new router or a replacement router for a failed unit. When the new or replacement router is rebooted, it uses the configuration from the compact flash card as the running and startup configuration. This functionality enables you to quickly configure new or replacement routers with a standard configuration with little or no manual configuration required.

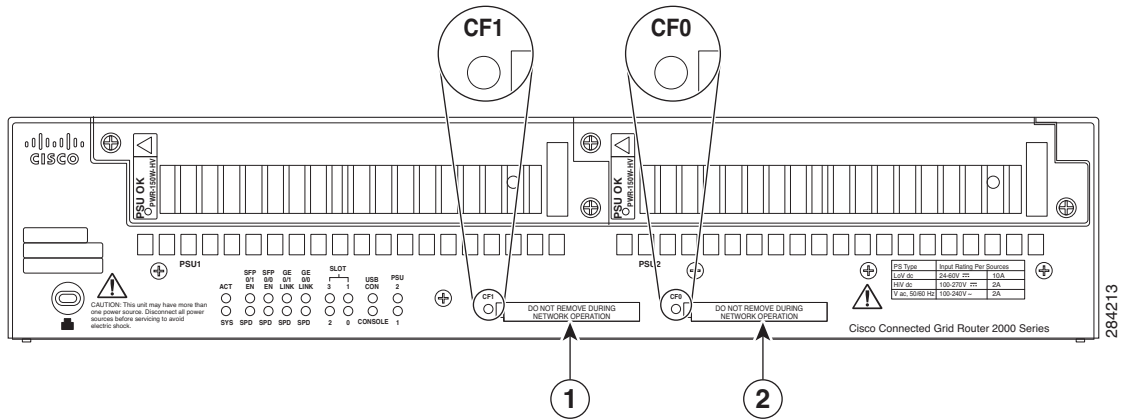
For more information on the Swap Drive feature, see:

http://www.cisco.com/en/US/docs/routers/connectedgrid/cgr2010/software/15_2_2_t/cgr2010_15_2_2_t_swgc.html#wp2039791

The router supports a maximum of two compact flash memory cards. The router ships with one compact flash card installed in Slot CF0 and supports a second, optional flash card that you can order with the router or supply separately.

Figure 5 illustrates the location of the compact flash card slots on the router.

Figure 5 Cisco Connected Grid 2010 Router—Compact Flash Memory Card Slot Locations



Item	Label on Router	Description	Cisco IOS Interface Name
1	CF1	This slot supports an optional compact flash card that you can order with the router or supply separately. The Connected Grid Swap Drive feature is not supported on this slot.	flash1:
2	CF0	This is the required slot for use with the Connected Grid Swap Drive feature. The router comes with a compact flash card already installed in this slot. The Connected Grid Swap Drive feature is supported on this CF slot only.	flash or flash0:

For additional information about the router compact flash memory support, refer to the router hardware installation guide at:

http://www.cisco.com/en/US/products/ps10977/prod_installation_guides_list.html