

Cisco 2010 Connected Grid Router Q&A

Product Overview

- Q.** What is the Cisco® 2010 Connected Grid Router (CGR 2010)?
- A.** The Cisco CGR 2010 is a rugged router designed for the harsh, rugged environments often found in the energy and utility industries. The Cisco CGR 2010 is designed to support the communications infrastructure needs for the energy delivery infrastructure across the generation, transmission, and distribution sectors. This infrastructure includes utility- and customer-owned energy infrastructure, such as substation applications supporting electrical transmission and distribution, renewable generation, oil and gas, water, distributed generation, co-generation, and trackside operations. The infrastructure also includes communications infrastructure for delivery applications such as transmission pipelines, distribution mains, and service lines for oil and gas and water. The CGR 2010 is part of the Cisco Connected Grid portfolio of products compliant with substation industry standards known as IEEE 1613 and IEC 61850. The CGR 2010 is a modular router supporting Grid Router WAN Interface Cards (GRWICs). For detailed product information about the Cisco CGR 2010, visit <http://www.cisco.com/go/cgr2000>.
- Q.** What other products are included in the Cisco Connected Grid portfolio?
- A.** In addition to the Cisco 2010 Connected Grid Router (CGR 2010), the Cisco 2520 Connected Grid Switch (CGS 2520) is also a new platform in the Connected Grid portfolio. It is designed for use in energy applications. For more information on the Cisco CGS 2520, please visit <http://www.cisco.com/go/cgs2500>.
- Q.** What are the IEEE 1613 and IEC 61850-3 standards?
- A.** Both the IEC and IEEE have developed and issued new standards addressing Electromagnetic Interference (EMI) requirements for communications networking equipment. Both groups borrowed heavily from the respective standards used for protective relaying devices, which are critical devices used for protection and control of the power system. Since more and more protection relays are using frame-based Ethernet network connectivity for the purpose of protection relaying, it was only natural that the communications also be made to comply with the same EMI, Electrostatic Discharge (ESD), and Radio Frequency Interference (RFI) immunity requirements.
- IEEE 1613—IEEE Standard Environmental and Testing Requirements for Communications Networking Devices in Electric Power Substations
 - IEC 61850-3 Communications Systems and Networks in Substations

In both cases the standards have a minimum requirement that the networking equipment operate without any physical damage, reset, or latch-up during the application of a variety of normally-destructive EMI immunity-type tests.

IEC 61850 consists of 10 parts that provide a comprehensive set of standards for communications networks in substations. It includes everything from environmental and EMI immunity requirements (IEC 61850-3) to conformance testing (IEC 61850-10).

The IEEE 1613 was also developed as a standard to address the proliferation of Ethernet networks in substation automation. Released in August of 2003, the IEEE 1613 IEEE Standard Environmental and Testing Requirements for Communications Networking Devices in Electric Power Substations addresses the environmental and performance requirements in networking equipment in substation environments. The majority of the specification was adopted from the IEEE C37.90.x standards for protective relaying systems.

Q. Does the CGR 2010 meet the IEC 61850 standard?

A. The IEC 61850 protocol provides a standard way to communicate between devices inside the substation, i.e. intra-substation communications. The CGR 2010 meets or exceeds IEC 61850-3, which includes the environmental requirements for substation communications gear.

One of the protocols in IEC 61850 used to communicate between protection relays is Generic Object Oriented Substation Event, or GOOSE protocol. This protocol is used for intra-substation communications. Addendums to the 61850 standard are in process to document GOOSE messaging over the WAN.

Q. How did Cisco certify the CGR 2010 to IEEE 1613 and IEC-61850-3 compliance standards?

A. Both the CGR 2010 Connected Grid Router and the CGS 2520 Connected Grid Switch have been certified by Cisco's compliance organization as well as KEMA, an international energy-consulting firm with a specialty in testing and certifications. Certificates will be made available to customers with valid non-disclosure agreements (NDAs) upon request.

Q. What are some primary features of the CGR 2010?

A. The CGR 2010 provides the utility with a highly secure substation network, which serves as the electronic security perimeter (ESP) for the substation. Utilities must comply with security mandates known as the NERC/CIP (North American Electric Reliability Corporation/Critical Infrastructure Protection). The CGR 2010 helps utilities converge disparate networks onto a common network infrastructure using Multiprotocol Label Switching VPN (MPLS-VPN) and VPN Routing and Forwarding (VRF). Also, the CGR 2010 is a multi-service platform with a comprehensive quality of service (QoS) feature set that helps prioritize substation control communications over other types of data (e.g., video, voice, and enterprise traffic). In addition, the CGR 2010 supports dual-redundant, hot-swap power supplies, which can also be used with the Cisco 2500 Series Connected Grid Switch. Finally, the CGR 2010 is a modular platform that supports Grid Router WAN Interface Card (GRWIC) slots that will allow customers to upgrade the platform over time to meet their networking requirements.

Q. What configuration options are available for the CGR 2010?

A. Table 1 shows the list of CGR 2010 options.

Table 1. CGR 2010 Connected Grid Router

Product Name (Part Number)	Description
Cisco 2010 Connected Grid Router (CGR-2010/K9)	Cisco CGR2010 w/2GE, 4 GRWIC slots, 256 MB CF, 1 GB DRAM, IPB
Cisco 2010 Connected Grid Router Security Bundle (CGR-2010-SEC/K9)	Cisco CGR2010 security bundle w/SEC license PAK
CGR 2010 field-replaceable high AC/DC power supply (PWR-RGD-AC-DC)	High AC/DC power supply for CGR-2010/K9 and CGR-2010-SEC/K9 (88-300VDC, 85-264VAC)

Product Name (Part Number)	Description
CGR 2010 field-replaceable low DC power supply (PWR-RGD-LOW-DC)	Low DC power supply for CGR-2010/K9 and CGR-2010-SEC/K9 (24-60VDC)
1-port and 2-port T1/E1 GRWIC (GRWIC-1CE1T1-PRI and GRWIC-2CE1T1-PRI)	1-port and 2-port channelized T1/E1 and PRI GRWIC (data only)
8-port asyn/sync serial (GRWIC-8A/S-232)	8-Port Async/Sync Serial GRWIC, EIA-232
2G/3G/4G Multimode LTE GRWIC (GRWIC-4G-LTE-V) NEW	2G/3G/4G Multimode LTE GRWIC for Cellular Communications
Etherswitch module (GRWIC-D-ES-6S and GRWIC-D-ES-2S-8PC) NEW	<ul style="list-style-type: none"> • GRWIC-D-ES-6S <ul style="list-style-type: none"> ◦ 4x FE fiber SFP port ◦ 1x GE combo port ◦ 1x GE fiber SFP port • GRWIC-D-ES-2S-8PC <ul style="list-style-type: none"> ◦ 8x FE RJ45 ports (Power over Ethernet* support on first four ports) ◦ 1xGE combo port ◦ 1xGE fiber SFP port <p>CGR 2010 supports 61.5W of PoE power</p>

Technology Overview—Hardware

- Q.** On what platform is the CGR 2010 based?
- A.** The Cisco CGR 2010 is based on the Cisco 2901 Integrated Services Router (ISR), though the hardware is optimized for harsh environments.
- Q.** What Cisco IOS® Software feature images does the CGR 2010 support?
- A.** The CGR 2010 supports Cisco IOS Software Release 15.1(4)M, while the Ethernet Switch Module GRWIC supports 12.2(58)EY1.
- Q.** What is the operating temperature range for the CGR 2010?
- A.** The CGR 2010 is designed to operate from -40° C to +60° C. In addition, temperature-type tests of -40° C to +85° C have been conducted as well. Please refer to the CGR 2010 datasheet for complete details.
- Q.** How many GRWIC slots are available on the CGR 2010?
- A.** The CGR 2010 has four single-wide GRWIC slots. GRWIC modules may be single-wide or double-wide.
- Q.** Are there any limitations to the quantity and type of GRWICs populated in the CGR 2010?
- A.** A maximum of four single-wide GRWICs can be installed or two double-wide GRWICs. Please see the interface and module datasheets for further details
http://www.cisco.com/en/US/products/ps10977/products_relevant_interfaces_and_modules.html
- Q.** What is the purpose of the 8-port Serial RS-232 GRWIC?
- A.** The 8-port RS-232 provides substation operators with a way to connect directly to Remote Terminal Units (RTUs). Supervisory Control and Data Acquisition (SCADA) communications pass directly to the CGR 2010 through the serial interface and can be tunneled over an IP based network using a Bisync Serial Tunnel (BSTUN). One or more 8-port serial GRWICs can also function as a terminal server to allow for a way to perform out-of-band management for multiple devices sitting behind the router.

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- Q.** Will the CGR 2010 support existing WAN interface cards (WIC), high-speed WAN interface cards (HWIC), or Voice/WAN interface cards (VWIC) from the Cisco Integrated Services Routers Family?
- A.** No. The form factor of GRWICs and ISR WIC, HWIC, and VWICs are different. The GRWICs are designed for withstanding harsh environments in substations. The GRWICs are larger to dissipate heat in a fanless system.
- Q.** What power supply options are available for the CGR 2010?
- A.** The CGR 2010 supports two power supply options: 1) high AC/DC and 2) low DC. The high AC/DC (PWR-RGD-AC-DC) supports nominal voltages of either 88-300VDC or 85-264VAC. The low DC (PWR-RGD-LOW-DC) supports nominal voltages of 24-60VDC. These are the same power supply options on the Cisco 2520 Connected Grid Switch.
- Q.** Why does the CGR 2010 offer both a low DC (24-60V) power supply and a high AC/DC (88-300VDC/85-264VAC) power supply?
- A.** Energy customers have a wide range of power input requirements, so providing a breadth of power input options is important to support different applications. Customers will typically connect a second power supply to a battery backup source for additional redundancy. The CGR 2010 allows a user to mix and match power supplies for maximum flexibility.
- Q.** Does the CGR 2010 support positive and negative DC power?
- A.** Yes, the CGR 2010 supports positive and negative DC power. Please reference the hardware installation guide and power installation guide for further details.
http://www.cisco.com/en/US/docs/routers/access/2000/CGR2010/hardware/installation/guide/CGR2010_HIG.html
- Q.** Can the CGR 2010 run on one power supply?
- A.** Yes, only one power supply is needed for operation of the router. The Cisco CGR 2010 supports one or two field-replaceable power supplies. When both modules are used, power redundancy and load sharing are also available. In addition, the CGR 2010 can also operate in a mixed high-AC/DC and low-DC configuration where a chassis has a high AC/DC power supply in one slot and a low DC power supply in the second slot.
- Q.** Are power cables included in the CGR 2010?
- A.** No, the CGR 2010 has a terminal block to power from either AC or DC sources. Power engineers can modify existing power cables to match the power source and desired cable length. Please refer to the hardware installation guide for further details.
http://www.cisco.com/en/US/docs/routers/access/2000/CGR2010/hardware/installation/guide/CGR2010_HIG.html
- Q.** What is a dual-purpose port?
- A.** A dual-purpose port is a combination of one 10/100/1000-TX copper port and one Small Form-Factor Pluggable (SFP)-based Gigabit Ethernet port. One of these two ports can be used at a time. This added flexibility allows cost-effective use of interfaces. The CGR 2010 provides two dual-purpose Gigabit Ethernet ports standard on the router.
- Q.** What SFP modules are supported on the Cisco CGR 2010?
- A.** Cisco CGR 2010 supports both 100-Mbps and 1000-Mbps SFP modules. The options include Cisco 100BASE-LX-RGD, 100BASE-FX-RGD, 1000BASE-LX-RGD, 1000BASE-SX-RGD, and 1000BASE-ZX-RGD

SFP modules. Commercial Grade SFPs from Cisco or any third-party provider are not supported on this platform.

Technology Overview—Software

- Q.** Does the CGR 2010 support telephony features?
- A.** The CGR 2010 does not support Survivable Remote Site Telephony (SRST) or any analog connectivity natively. The CGR 2010 Ethernet Switch Module (GRWIC-D-ES-2S-8PC) does support Power over Ethernet (PoE) and can be configured to support IP phones. While there is no native voice VLAN support today, you can use a trunked port configuration for tagged traffic from the IP phone to the Ethernet switch module to support IP phones.
- Q.** Does the CGR 2010 support software licenses?
- A.** Yes. There will be two CGR 2010 products available to order. The first SKU is the CGR-2010/K9, which will offer the IP Base license. The second SKU will be the CGR-2010-SEC/K9 which will offer the IP Base and SEC images. Additional licenses can be selected at the time of order.
- Q.** Does the CGR 2010 support SCADA signatures?
- A.** Yes, the CGR 2010 supports SCADA specific signatures as part of the IPS or Intrusion Prevention System built into the IOS operating system. There are many DNP3 and Modbus specific signatures that monitor packet data for suspicious attack patterns, providing an extra layer of security at the substation.

Technology Overview—Management

- Q.** What are the management capabilities of the Cisco CGR 2010?
- A.** The Cisco CGR 2010 supports numerous management features. Support for Simple Network Management Protocol (SNMP) Versions 1, 2c, and 3, and Telnet interface support enable comprehensive in-band management, and a command-line-based management console enables detailed out-of-band management.

CiscoWorks network management software provides management capabilities to the Cisco CGR 2010 on a per-port and per-switch basis, providing a common management interface for Cisco routers, switches, and hubs.

In addition, Cisco Configuration Professional (<http://www.cisco.com/go/ciscocp>), an easy-to-use graphical user interface (GUI) will be available for the CGR 2010.

For More Information

For detailed product information about the CGR 2010, visit: <http://www.cisco.com/go/cgr2010>



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Page 6 of 5